

Vichaar-Vimarsh **JUST** Transition NEWSLETTER



Issue no. 08- ERD | TERI | October 2025

FUTURE-READY YOUTH: HARNESSING THE DEMOGRAPHIC DIVIDEND FOR JUST TRANSITIONS

Message from the Desk of Senior Director, TERI

TERI is delighted to release the eighth edition of Vichaar-Vimarsh: Just Transition Newsletter. The theme, "Future-Ready Youth: Harnessing the Demographic Dividend for Just Transitions" underscores the vital role of youth as a key stakeholder in shaping a participatory, inclusive, and equitable transition away from coal-based industries.

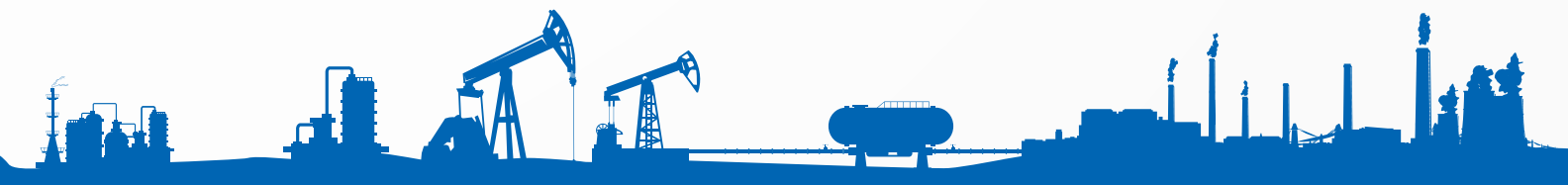
As India navigates its path towards a sustainable and low-carbon energy future, it becomes imperative to empower young demography with the knowledge, skills, and opportunities needed to lead and benefit from this socio-economic transformation. Through this edition, we aim to highlight innovative perspectives, emerging research, and on-ground initiatives that empower youth to become active agents of change in building a just, resilient, and low-carbon economy.

We hope this issue fosters meaningful dialogue, renewed commitment and collective action towards a future where the aspirations and agency of youth become the cornerstone of a just transition that truly leaves no one behind.

A K Saxena

Senior Director

Electricity and Renewables Division



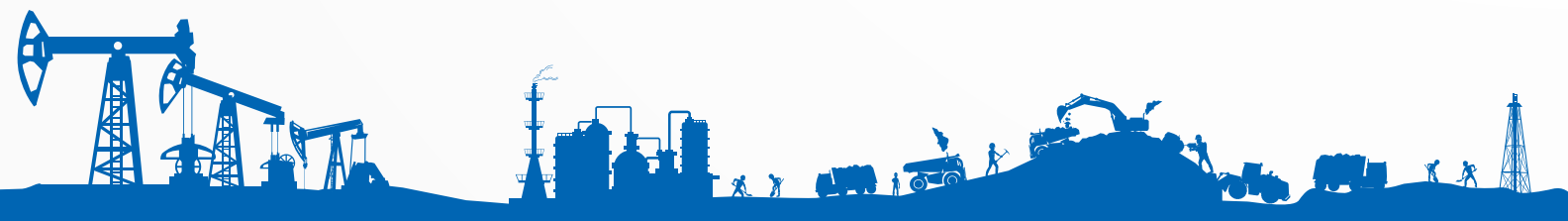


Young woman taking part in upskilling initiative run by TERI in Giridih.



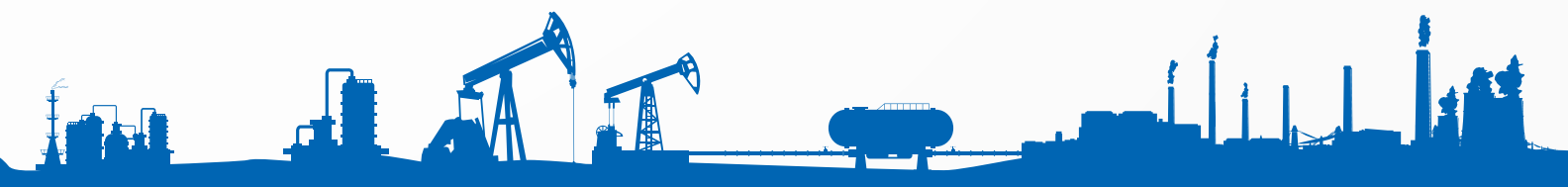
Delivering on a just transition is the real litmus test for climate policy. It shows whether governments are aligned with people or power. our generation refuses to accept climate action that deepens injustice. If Belem is to be the implementation COP, then just transition cannot remain mere principles, but be turned into reality through a Belem Action Mechanism that delivers justice for those living the transition everyday.

**- Carmen Wabnitz,
Board Member, Klimadelegation, Co-Contact Point YOUNGO Just Transition Working Group**



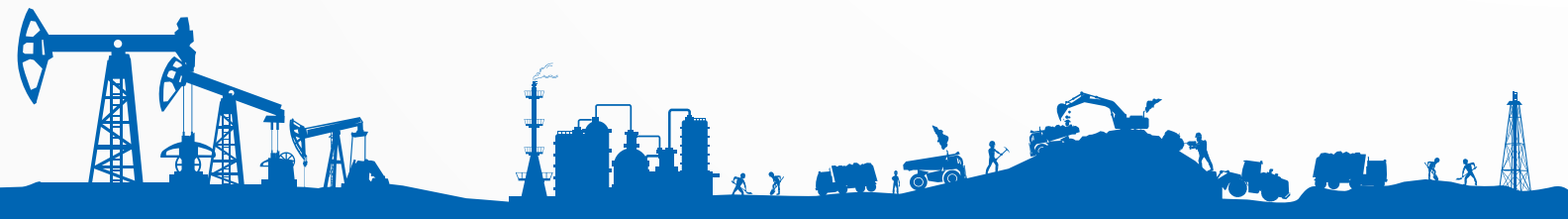
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Men packing and loading pilfered coal onto a cycle for transport to local market in Giridih.



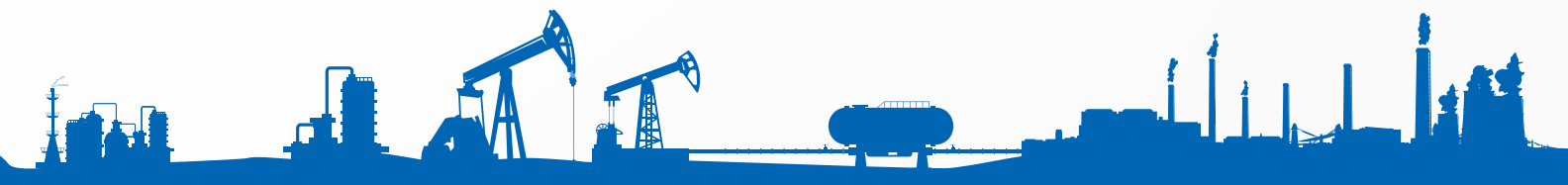
Editorial

Human civilization has been constantly transitioning and evolving into a progressive ecosystem from time immemorial. Last few decades bear the testimony of such transition particularly in IT, open market economy, digital space and health sector. Of late transition in the energy, mobility and technology domains is the talking point and one finds huge interest being generated around these themes. This thinking, deliberation and reflective journey about comprehending the 'future' itself is transformational and intuitively rewarding as this thought is likely to trigger innovation, evidence generation, greater belief in alliance building, and institutional convergence. This discourse on 'transition' makes it more intriguing as we add a layer of justice with the normative constructs such as equity, resilience, inclusion, people-centricity, etc.

Being driven by 'socially responsible transition' we took a conscious call to focus on the demographic dividend in India as we logically connect this window of opportunity with futuristic ambitions. Hence, dedicating this edition to the nation's youth, the critical stakeholder in energy transition, who could contribute to shaping our shared future. Objectively thinking and planning for the youth and investing in them to build the human capital, is imperative for nation building.

Let this deliberation open a space for further reflections on innovative approaches and out-of-the-box thinking to harness the immense potential of demographic dividend for inducing generational change. Perhaps this can become a reality only when we choose to take a holistic view underpinning empathy and compassion.

- Jayanta Mitra, PhD, Senior Fellow, TERI



FROM COAL DUST TO GREEN DREAMS: EMPOWERING YOUTH FOR INDIA'S JUST ENERGY TRANSITION

Prabuddh Vaidya, Research Associate, The Energy and Resources Institute (TERI)



A view of the coal mine in Giridih, Jharkhand

“The future belongs to those who prepare for it today.” —
Malcolm X

In the heart of India's coal country, in towns like Dhanbad, Korba, Singrauli and Angul, the hum of machinery and the soot of the mines have long defined both the economy and the identity of its people. For decades, coal has powered India's growth and the livelihoods of millions who have laboured in and around the mines. Yet today, as the nation steps into a new era of renewable energy

and climate consciousness, these very regions stand at a critical crossroads. The future of the youth here will determine whether this energy transition becomes truly just.

India is home to one of the youngest populations in the world, with nearly two-thirds under the age of 35. This youthful energy is an asset, but it also poses a challenge of ensuring that these millions find meaningful, sustainable livelihoods in a rapidly changing world. In



coal regions, this challenge feels particularly urgent. Many of the youth here have grown up watching their fathers and uncles head to the mines each day, proud to power the nation's progress. Now, as mines close and the coal economy wanes, they ask a simple but profound question: "What about us?"

The employment landscape in these areas reveals the complexity of this question. Coal has never been just an industry, it has been an ecosystem. Beyond the miners and plant operators directly employed in coal production, countless others depend indirectly on the coal economy: transporters ferrying coal to plants, small shopkeepers and tea stall owners serving mining communities, local mechanics and construction workers thriving on the ancillary boom. As the world shifts towards cleaner energy, this intricate web of dependence begins to fray. The challenge, then, is not merely to replace coal jobs with green ones, but to reimagine entire local economies in a way that is inclusive, diverse, and future-proof.

BEYOND THE MINERS AND PLANT OPERATORS DIRECTLY EMPLOYED IN COAL PRODUCTION, COUNTLESS OTHERS DEPEND INDIRECTLY ON THE COAL ECONOMY: TRANSPORTERS FERRYING COAL TO PLANTS, SMALL SHOPKEEPERS AND TEA STALL OWNERS SERVING MINING COMMUNITIES, LOCAL MECHANICS AND CONSTRUCTION WORKERS THRIVING ON THE ANCILLARY BOOM.

At the heart of this re-imagination lies the idea of equipping skilling youth with the tools to navigate and shape a new world of work. Traditionally, skilling in these regions meant learning trades like welding, machinery operation, plumbing or driving, practical but narrowly defined skills rooted in the extractive economy. Today, however, the meaning of skilling is evolving. It now encompasses adaptability, digital literacy, and environmental awareness, capacities that prepare young people not just for jobs, but for lifelong learning in a fast-changing landscape.

Institutions such as the Skill Council for Green Jobs (SCGJ) are spearheading this transformation, offering training in solar installation, waste management, and

energy efficiency. Similarly, Krishi Vigyan Kendras (KVKs) are promoting sustainable agriculture, agroforestry, and water management practices that connect rural youth to both food and energy security. On the other hand, Kaushal Vikas Kendras are not just skilling the youth but also formalizing their traditional knowledge.

This rebuilding is visible in the emergence of new livelihood avenues that align with both local realities and global imperatives. Imagine solar panels glimmering above fields of crops a practice known as agro-photovoltaics, where farmers earn dual income from food and energy. Picture reclaimed mining lands transformed into biodiversity parks, tended by local youth trained as naturalists and eco-guides. Consider self-help groups (SHGs), especially women-led ones, managing nurseries under CAMPA (Compensatory Afforestation Fund Management and Planning Authority) to restore degraded forests. In these initiatives, the youth are not passive recipients of change; they are active agents of a greener future.

Migration adds another layer to this story. Historically, coal regions have been magnets for labour migration. Men and women from poorer states moved to mining towns in search of livelihoods. Now, as the coal economy declines, migration patterns are shifting. Young people are once again leaving their hometowns, this time to work on renewable energy projects, in solar parks, or in cities offering cleaner and more stable opportunities. Yet, the future could hold a different possibility: what if these same coal regions became the new destinations for green development? If local youth were trained and employed in afforestation, decentralized solar systems, eco-restoration, and sustainable enterprises, migration could transform from a story of compulsion to one of choice from leaving home to finding purpose in it.

Underlying all of this is the critical education–awareness–skill nexus. In many mining regions, school dropout rates remain high, and awareness of green careers is limited. Without strengthening this foundational triad, any transition will be incomplete. Schools must integrate sustainability and energy literacy into their curricula, connecting young minds to the realities of climate and ecology. Industrial Training Institutes (ITIs) and polytechnics can partner with renewable energy firms to provide hands-on technical exposure. Meanwhile, community initiatives through KVKs, NGOs, and local governance institutions can spread awareness about sustainable livelihoods and the dignity of green work. When a young woman in Jharkhand says, "I never thought



the sun could be my employer,” it is not just a quote it’s the beginning of a paradigm shift. The role of youth in greening India’s transition cannot be overstated. They can become custodians of forests and rivers, innovators of clean technologies, and leaders of community-driven sustainability. Through SHGs, youth collectives, and local governance structures, they can participate in afforestation, watershed restoration, and eco-monitoring. CAMPA-funded projects and MGNREGA schemes can be aligned to provide green employment. Restoring mined-out lands, stabilizing soils, and building rainwater harvesting systems. Training programmes under the Green Skill Development Programme (GSDP) can further expand this ecosystem, turning environmental protection into a livelihood opportunity rather than a charity cause.

The integration of renewable energy (RE) with local development planning can accelerate this vision. Reclaimed mining lands can host solar parks, hybridized with agroforestry, providing not only clean power but also jobs in installation, maintenance, and ecosystem management. The Singrauli Solar City project, which retrained former mine workers as solar technicians, is a promising start. Similarly, Jharkhand’s forest-based livelihood programmes under CAMPA are enabling youth to work as nursery managers and eco-restoration workers. These initiatives embody what a just transition truly means, one that is not only energy-efficient but also socially equitable and locally empowering.

At a deeper level, this transformation is about dignity

and belonging. For generations, coal has been both the pride and pain of India’s industrial heartlands. As the world now turns towards renewables, there is a risk that communities tied to coal will feel left behind and victims of progress rather than participants in it. A just transition demands that we counter that narrative, not by romanticizing the past, but by reimagining the future. The youth can be the bridge linking tradition with innovation, resilience with regeneration.

Ultimately, the success of India’s just transition will depend not on how fast we build solar parks or wind farms, but on how well we nurture human potential. Every solar technician trained in a former coal town, every naturalist restoring a mined landscape, every young woman leading an SHG nursery, each represents a microcosm of hope. Together, they form the foundation of a new social contract between people and planet.

As the sun sets on the coal era, it rises over a generation ready to take charge, a generation that sees opportunity in sustainability, pride in restoration, and hope in hard work. The future-ready youth of India’s coal regions are not just bystanders to change; they are its very architects. In their hands lies the promise that the energy transition will be not only green but also just, not only about watts and megawatts, but about lives, livelihoods, and lasting dignity.

“In the ashes of coal, the seeds of renewal are being sown.”



SKILL DEVELOPMENT AND LIVELIHOODS FOR YOUTH IN TRANSITIONING INDUSTRIAL ECONOMIES

Shraddha Pushp, Project Manager, Department of Women and Child Development, Govt. of Bihar



Cutting turf on Achill Island. Ireland's action on climate change comes as it is facing up to €600m in emissions fines
(Source: *The Guardian*)

As India advances its low-carbon transition, coal-dependent regions face intertwined challenges of economic diversification and workforce reskilling. Skill development emerges as a critical enabler for ensuring inclusive growth, employment security, and regional resilience. Drawing lessons from the Irish Midlands, this paper highlights the value of localized planning, institutional coordination, and targeted pathways for re-skilling and economic diversification. It calls for an

integrated governance approach to manage India's transition towards a sustainable and equitable post-coal economy.

Climate change is one of the most complex and urgent challenges facing humanity. With energy-related emissions contributing roughly three-quarters of global CO₂ emissions (REN21, 2022). McCauley et al. (2019) emphasize that a transition to a low-carbon and more equitable global energy system is imperative. However,

transitioning from coal to alternative energy sources presents significant challenges. India is the world's second-largest producer, consumer, and importer of coal, which meets approximately 55% of the nation's primary energy demand (PIB, 2022). The sector also has a substantial employment footprint: a district-level study estimates that around 3.6 million people are engaged, directly or indirectly, in coal mining and power across 159 districts, with 80% of these jobs in coal mining (51 districts) and the remaining 20% in coal-fired power plants (Aggarwal, 2021). The challenge is particularly acute in tribal states, where coal revenues form a significant portion of the Gross State Domestic Product (GSDP) in FY 2022–23, fossil fuels accounted for 32% of Jharkhand's revenue, 22% of Chhattisgarh's, and 16% of Odisha's (IEEFA & CEED, 2024). These interlinked economic and social dependencies contribute to a 'carbon lock-in' (Unruh, 2000), complicating the transition to cleaner energy.

The International Labour Organization (ILO) adopted guidelines for a Just Transition in 2015, envisioning the energy transition as an opportunity for skilling, reskilling, upskilling (UNESCO-UNEVOC, 2022) workers from coal-based industries to green jobs, while promoting safer workplaces and equitable growth for women and marginalized communities (ILO, 2015). The ILO defines Just Transition as: "A just transition for all towards an environmentally sustainable economy ... needs to be well managed and contribute to the goals of decent work for all, social inclusion and the eradication of poverty" (ILO, 2015, p. 4). It further states that transitioning to a low-carbon, energy-efficient economy could generate 24 million new jobs globally, while simultaneously phasing out approximately six million positions, resulting in a net employment gain of 18 million jobs by 2030 (ILO, 2018, Greening with Jobs, p. 43). This projection highlights the dual imperative of economic restructuring and human capital development: workers displaced from traditional energy sectors require rapid and comprehensive reskilling to access emerging opportunities in renewable energy, energy efficiency, green manufacturing, and sustainable services.

In the Indian context, the stakes are particularly high. The country's working-age population has grown from 59% in 2011 to 63% in 2021, presenting a demographic dividend that could drive economic growth if harnessed effectively (ILO, 2023). At the same time, India remains heavily dependent on coal for both energy and employment, particularly in its eastern states such as

Jharkhand, Chhattisgarh, and Odisha. This combination of a large workforce and high coal dependency makes skill development and economic diversification for sustainable livelihood a critical and immediate priority. Without systematic interventions to equip workers for green jobs, India risks both widespread unemployment in coal regions and the underutilization of its demographic advantage. By aligning the principles of Just Transition with targeted national skilling policies and state economic priority, India can simultaneously advance climate goals, economic resilience, and inclusive growth.

WITHOUT SYSTEMATIC INTERVENTIONS TO EQUIP WORKERS FOR GREEN JOBS, INDIA RISKS BOTH WIDESPREAD UNEMPLOYMENT IN COAL REGIONS AND THE UNDERUTILIZATION OF ITS DEMOGRAPHIC ADVANTAGE.

However, skill development and economic diversification alone cannot address the challenge of mono-sectoral dependence on coal. A broader framework of regional economic development is required to complement them, one that facilitates diversification and fosters new sources of employment. In India, Jharkhand has taken the lead by establishing a Task Force on Sustainable Just Transition (Notification No. 3247, 09 November 2022) to steer economic diversification and livelihood planning in its coal-dependent districts, while other coal-rich states such as Odisha and Chhattisgarh remain in the preparatory or policy discussion stages of developing similar institutional mechanisms.

In this context, the Ministry of Skill Development and Entrepreneurship (MSDE) holds a pivotal role as the lead department shaping and implementing the national skilling agenda. Complementing this, the Ministries of Agriculture and Rural Development, Micro, Small and Medium Enterprises (MSME), and Finance are equally critical in driving diversification and job creation within coal-dependent regions. Moreover, the Ministry of Finance, through its policies (Mudra, Stand-Up India and others) and public financial institutions, can enable innovative loan instruments and credit facilities that play a pivotal role in supporting entrepreneurship, enterprise development, and regional transformation. A compelling example can be drawn from the Irish Midlands, which



once relied heavily on peat (fossil fuel like coal) but has since emerged as a model for transitioning toward a more sustainable and diversified economy. The Midlands experience demonstrates how national policies, when effectively aligned with regional strategies and supported by dedicated regional institutions, can successfully facilitate structural transformation.

Case Study: The Irish Midlands



Bord na Móna workers throwing peat into harvesting machines in the 1950s. (Source: *The Guardian*)

The Irish Midlands comprises the four counties (almost remotely similar to districts) Laois, Offaly, Longford and Westmeath (with parts of nearby counties sometimes counted in the “wider midlands”) and is predominantly rural (population $\approx 299,889$; density ≈ 46 persons/km²) (Broughton & Dowling, 2020, p. 3). The regional labour market employed about 109,680 people in 2016 and is centred on towns such as Athlone, Longford, Mullingar, Tullamore and Portlaoise, with the local economy historically dominated by peat extraction and its supply chains (Broughton & Dowling, 2020, p. 3).

The accelerated phase-out of peat in the Irish Midlands triggered a structural shock, as heavy reliance on Bord na Móna, a semi-state company, and ESB, the state-owned electricity utility, produced a classic mono-economic structure and exposed the region to a mid-term policy dilemma between immediate support measures and longer-term transformation strategies (Broughton & Dowling, 2020, p. 6). The Midlands emphasizes four interlocking challenges that also characterize coal-dependent districts in Central India: reliance on a single major employer, constrained rural infrastructure (notably broadband and public transport), the need to align

schooling and career pipelines with new sectors, and the trade-off between immediate income supports and investments that pay off over five to ten years (Broughton & Dowling, 2020, pp. 6–7). These structural similarities make the Midlands a useful case study: while Indian coal regions are larger in absolute scale and often less well-resourced per capita, the nature of the problems like community dependence, skills misalignment and infrastructural barriers is comparable.

Rather than seeking a single replacement industry, the Midlands adopted a broader approach to diversification: firm-level pilots (waste recycling, landfill-gas electricity, a 84 MW wind farm) sat alongside trials in aquaculture, medicinal herbs and birch-water harvesting on rehabilitated bogland/wetlands, and plans for solar and other green uses of disused peat sites (Broughton & Dowling, 2020, pp. 4–5). At the policy level this was enabled by aligning national strategies (Enterprise 2025; Project Ireland 2040) with a Regional Enterprise Development Fund and a dedicated Midlands Regional Enterprise Plan that created financing windows and project pipelines (Broughton & Dowling, 2020, pp. 5–6). The practical lesson for coal regions in India is therefore programmatic: assemble a diversified set of plausible activities tied to local assets, fund pilot projects through a regional vehicle, and avoid “one big bet” by sequencing scale-up only after demonstrable local linkages are established.

The Midlands’ institutional architecture is central to its approach. Governance is devolved through regional strategies (State level) but implementation is convened locally by an office for the Midlands Regional Enterprise Plan and the Midlands Regional Transition Team (MRTT), which coordinates local authorities, enterprise agencies, education and skills boards, unions and private actors (Broughton & Dowling, 2020, pp. 5–6). The MRTT’s twin objectives to mitigate job losses through alternative employment and to attract investment that maximizes regional assets were operationalized through stakeholder forums, a project inventory and a targeted engagement process. Embedding a convening regional team with a clear mandate and cross-sector membership provided legitimacy for difficult trade-offs and enabled tailored interventions; replicating such an empowered, locally anchored transition body would help Indian coal states translate national funds into locally appropriate projects.

Skills-focused interventions in the Midlands began with comprehensive skills audits that mapped transferable mechanical and engineering competencies alongside



gaps in formal certification (Broughton & Dowling, 2020, p. 13). Building on the audit, Education and Training Boards and regional colleges delivered short, demand-led credentials for example a six-day retrofit course leading to QQI Level V certification (Quality and Qualifications Ireland, the national body that sets standards for education and training) and Springboard+ (a government-funded programme that provides free or heavily subsidized higher education courses for unemployed people or those looking to upskill) pathways into higher technical training; digital hubs and a Midlands Skills Centre expanded options for emerging sectors (Broughton & Dowling, 2020, pp. 13–14). This sequence audit, short recognized credentials, local delivery through Education and Training Boards (ETBs) and institutes, and linkage to employers reduced friction between reskilling and job placement. For Indian coal districts, the actionable prescription is identical in form: begin with worker/ coal miners family mapping, prioritize short vocational certifications directly aligned to local deployment (solar, retrofitting, waste-to-energy, site rehabilitation), and fund local providers who can deliver at scale in rural contexts for shorter term. However, in the longer term, skill development initiatives should be systematically integrated into the formal education system, ensuring that courses, sectors, and curricula are regularly updated to remain aligned with evolving industry demands and future workforce needs.

The Midlands case is not a direct template but a planning and institutional blueprint. Its success rests on coupling a diversified portfolio of projects facilitating economic diversification with a funded regional plan, a convening transition team, and tightly targeted skills pathways that certify and deploy labour into demand-led jobs. Scaling this in Central India requires adapting finance mechanisms to larger labour pools, strengthening state and local policies and rules so that trained workers access projects, and investing in digital and transport infrastructure to reduce rural isolation. The Midlands therefore offers a compact, transferable set of design choices portfolio diversification, devolved convening institutions, and audit-to-credential skills systems that Indian policymakers can adapt to the scale and fiscal realities of coal-dependent states.

By way of conclusion, we note that the Midlands experience serves not as a direct template but as a robust planning and institutional blueprint. Its success rested on coupling a diversified portfolio of projects with a funded regional plan, an empowered transition

COAL-PRODUCING STATES AND DISTRICTS SHOULD ESTABLISH LOCAL TRANSITION CELLS EMPOWERED TO PLAN, CONVENE, AND IMPLEMENT PLACE-BASED STRATEGIES.

team, and targeted skill pathways that certified and deployed workers into demand-led jobs. Translating this model to India's coal-bearing regions requires adapting financing mechanisms to a larger labour force, strengthening state and district policies to improve employability linkages, and investing in digital and transport infrastructure to reduce rural isolation. To steer this complex transformation, India must institutionalize a National Coal Transition Think Tank, a dedicated body to drive policy coherence, inter-ministerial coordination, and applied research on regional diversification and skilling. Complementing this, coal-producing states and districts should establish local transition cells empowered to plan, convene, and implement place-based strategies. Together, these multi-tiered mechanisms can align national vision with regional execution, leverage existing skilling and financial instruments, and ensure that communities most affected by coal's decline particularly youth entering the labour market are active participants in shaping sustainable livelihoods within a just and inclusive transition.

The author would like to acknowledge Mr Abhishek Kumar for his valuable contribution in preparing this article.

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INTEGRATING MARGINALIZED YOUTH IN THE JUST URBAN TRANSITION: A PATHWAY TO INCLUSIVE CLIMATE ACTION

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Labourers resting next to coal used to fire bricks in the background in Jharia, Jharkhand

Introduction

To battle the adverse effect of climate change, a shift from extractive “brown” industries to sustainable “green” (Stark, A et al., 2023) is need of the hour, as ‘it could replace the highly polluted, dangerous, grey economy with an environmentally friendly, healthy, green economy’ (Ehresman & Okereke, 2015, as cited Wang & Lo, 2021). Just Transition is conceptualized to make it fair and inclusive (Stark et al., 2023), within which

intersect these five major topics, i.e., (1) just transition as a labour-oriented concept, (2) just transition as an integrated framework for justice, (3) just transition as a theory of socio-technical transition, (4) just transition as a governance strategy, and (5) just transition as public perception (Wang & Lo, 2021). A clear gap evident in the above categorization is the intersection of ‘just transition’ with ‘the urban’ (Hughes & Hoffman, 2020), and where cities are defined not only as geographical territories but as important stakeholders in the climate conversation.



Indian cities, as Kashwan (2025) notes, were designed to facilitate trade and commerce and protect the health and wealth of the colonial elite, pushing the majority of the urban population to the margins. Today, this is being maintained with caste and religious segregation and informal settlement reproducing marginalization and exclusion prevalent in rural India (Kashwan, 2025). Subsequently, the role of the urban poor — who constitute around 25% of India's urban population (Census, 2011) and live in informal settlements — remains unclear in this transitory development, specifically in planning and decision-making.

TRANSITION IN INDIA MUST EXPLICITLY FOCUS ON URBAN JUST TRANSITION, PARTICULARLY ON THE NEEDS OF YOUTH AND MARGINALISED COMMUNITIES, MOVING BEYOND TECHNOCRATIC SUSTAINABLE TRANSITION MODELS TO DEFINE A JUST TRANSITION

At the forefront of these transitions are workers, youth, and communities whose livelihoods depend on transitioning sectors. Given that, a transition-induced migration is a reality, as a shift from coal to renewable energy sources — people would move to cities in search of new opportunities (Dsouza & Singhal, 2021) and 'especially by younger people in search of better livelihoods' (Sterrett, 2016). These 'involuntary' migrations exacerbate growing poverty and inequalities in those urban areas; therefore, the government needs to take a more interventionist governance style (Stavis and Felli, 2015, as cited in Stark et al., 2023). Therefore, this article argues that transition in India must explicitly focus on urban just transition, particularly on the needs of youth and marginalized communities, moving beyond technocratic sustainable transition models to define a just transition as a set of principles "that build economic and political power to shift from an extractive economy to a regenerative economy." (Climate Justice Alliance, n.d.) and to counter structural inequalities.

Understanding the Urban Landscape

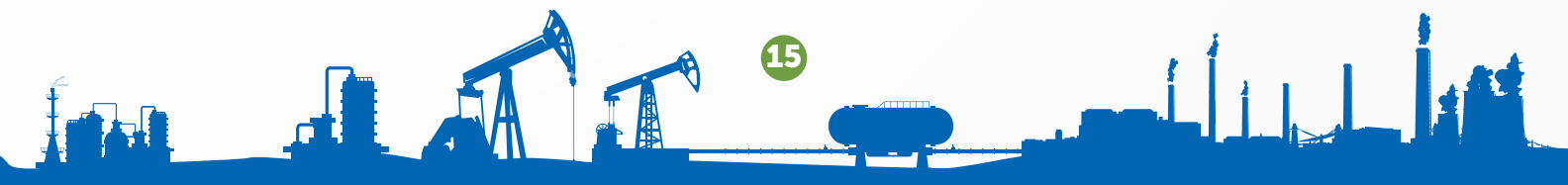
Urban regions, in particular, are hotspots of economic activity — are responsible for about 75 per cent of

the world's energy consumption (UN, 2021), and approximately 70% of global CO₂ emissions (IPCC, 2022) — and have to be prepared to accommodate the demands of such a shift in a just and inclusive manner. According to the World Bank, currently, 4.4 billion people — just over half the world's population live in cities, and the urban population is expected to double by 2050, when nearly 7 out of every 10 people will call cities home (World Bank, n.d.).

Cities are transitioning to low-carbon spaces by emphasizing green infrastructure development, innovative resource management, promoting green technologies, and adopting transportation alternatives. Cities, then, will experience both a transition in their composition and constitution. Transitioning thus requires deconstructing of urban, which is a complex process, hence it needs a multi-dimensional framework that encompasses urban form (including density, transportation, and built infrastructures), informality (converging with housing, work, waste management, and transportation), and formality (covering sectors of industry, housing, transportation, and energy use), as this approach recognizes that urban development cannot be understood through single-sector analysis but requires integrated frameworks accounting for complex interactions between physical form, economic systems, and governance structures (Cities Alliance, 2021; Roy, 2005).

The governance complexities in cities must be taken into consideration, not just by local governments (such as municipalities), but also by subnational and national governments (including various ministries), as well as non-elected administrative structures (like development authorities), which play an important role in the governance and management of cities. Nevertheless, one of the significant gaps in much-discussed governance is that it rarely documents or articulating the process of governance model development or selection, the degree of participation of stakeholders or the effectiveness of the process and impacts on policy and outcomes (Stark et al., 2023).

Cities are uniquely and profoundly impacted by climate change, extreme weather events, and shifts in resources. Water scarcity, sea-level rise, and heatwaves pose significant threats to city dwellers worldwide. However, cities in low- and middle-income countries are ten times more likely to be affected by flooding and droughts than those in high-income countries (UN-Habitat, 2024). Not only are these impacts felt most strongly in the Global



South, but within cities, the most marginalized are the most affected — as ‘cities can also exacerbate social and spatial injustices and disparities, driven by multiple intersecting factors such as race, class, gender, and ethnicity (Pottinger-Glass et al., 2023) caste and religious segregation (Kashwan, 2025). Increasing research and scholarship emphasise the argument for, and the operationalization of, transitions both globally (Wang & Lo, 2021) and in India (Tandon & Mitra, 2021).

As per Economic Survey 2023–24, it is expected that by 2030, more than 40 percent of India’s population will live in urban areas (PIB, 2024) making India home to one of the world’s largest (600 millions) urban populations (World Bank, 2024), which is projected to contribute 75 per cent of total GDP (Coalition for Urban Transitions, 2019). India is projected to be one of the most vulnerable countries to climate change (Revi, 2008; Yenneti et al., 2016, cited in Kashwan, 2025), and this vulnerability is exacerbated by increasing urbanization accompanied by rising vulnerability (Gogoi et al., 2023). This requires interrogating the contours of ‘just urban transition’, which moves beyond mere ‘sustainable transition’, both of which are relevant and necessary for Indian cities. It further indicates potential entry points for influencing just urban transitions (JUT) at the levels of research, policy, and practice, as well as its implications for youth.

Youth in Just Transition

Indian National Youth Policy defines people aged 15–29 as youth. According to the Ministry of Skill Development and Entrepreneurship (2024), India has a median age of 28, with 65% of the population under the age of 35. However, Chatterjee & Swarnakar (2023) argue that youth is best understood as a transitional stage, particularly in employment, where education, social norms, and individual goals shape young people’s movement within labour markets. Therefore, it presents both the most significant challenge and the most promising opportunity in the country’s transition towards a sustainable, low-carbon economy.

One of significant implication of Transition on youth is observed in the World Youth Report (2018) by the United Nations Department of Economic and Social Affairs (UN DESA), which states that ‘the significant challenges is that greening process takes the dirtiest, most precarious, and least decent work away from people in poverty but often leaves them with no work at all and increased costs for cleaner fuels.’ For India, this is alarming, as the informal economy dominates the country’s labour market, with

GREENING PROCESS TAKES THE DIRTIEST, MOST PRECARIOUS, AND LEAST DECENT WORK AWAY FROM PEOPLE IN POVERTY BUT OFTEN LEAVES THEM WITH NO WORK AT ALL AND INCREASED COSTS FOR CLEANER FUELS.

88.8% of employment being informal, representing over 450 million workers (ILO, 2024 (A), with youth being the predominant contributors. Subsequently, informality is a mode of employment meant to exploit and marginalize the labour, especially people belonging to SCs and ST categories (Bremar, 2016). Additionally, they lack legal recognition, social protection, and access to decision-making, making them disproportionately vulnerable to climate risks and economic disruptions (OECD, 2024).

Correspondingly, participation of youth in addressing climate change is a significant challenge due to participation bias based on socio-economic status (not extending beyond formal education background), a general lack of awareness about climate change (gaps in educational curricula and perception constraints), and climate action being top-down (Driver & Shankar, 2024).

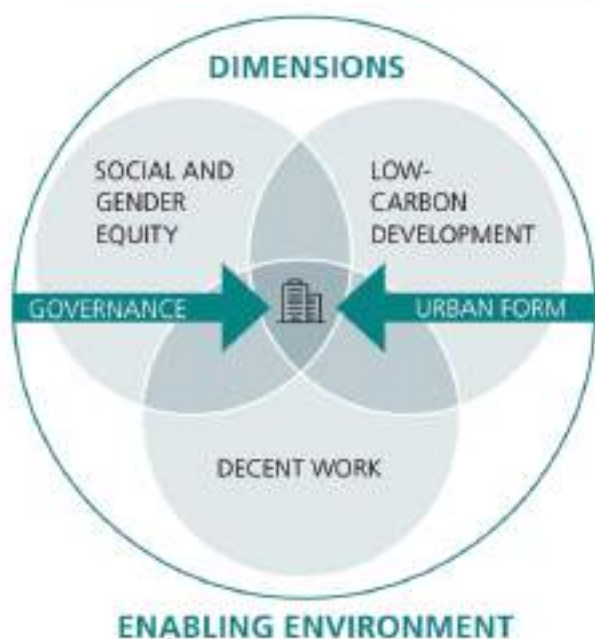
Conceptualizing Just Urban Transitions in India with a Focus on Youth

India’s just transition policy and planning, which have primarily focused on the coal and power sector, need a shift to include all other sectors impacted by fossil fuels (Bhushan & Banerjee, 2023). Additionally, Indian cities’ transitory process of development needs to be reconsidered, as urban development in the past has been a major focus with the conceptualization of smart cities and digital cities, which lacks a justice framework and ‘delinked the focus of transition from workers, instead placing focus on the role of the technological shift and private influence (Pottinger-Glass et al., 2023). Applying a justice lens involves addressing the three interlinked dimensions of justice—distributional, recognitional, and procedural (Stark et al., 2023)—through practical measures such as industrial restructuring, technological innovation, and poverty reduction. These approaches help advance social and environmental justice outcomes within and across nations (Wang & Lo, 2021).



The closest framework to address the above-noted challenge is captured by the Glass-Potter et al. (2023) framework. With three dimensions, which encompass the urban sustainability framework. Decent Work is used instead of economies to emphasize workers as individuals who make up the economy. Given India's demography, the majority of workers are young, and emerging (green) skills gaps are evident that existing government policies must address through greening of labour markets with skilling, upskilling or reskilling of workers (ILO, 2022). The framework also adequately considers the intersections between equity, economy, and the environment.

A framework for just urban transition



India has a well-developed affirmative action policy aimed at empowering youth and promoting social harmony, which, if implemented effectively, can contribute significantly to both environmental and economic benefits (ILO, 2024 (B)). The complexities of urban form and governance are significant; however just transition policy making is often town down missing needs of the most affected groups (TERI, 2023); therefore, city-level governance structures must institutionalize participatory processes such as community advisory panels, youth groups, multi-stakeholder climate forums and ensure inclusive participation of affected communities (especially from informal settlements) to establish transparent monitoring and evaluation frameworks that make the decision-making process more transparent, inclusive, and evidence-driven.

Another recent framework which captures urban nuances is by Eadson et al. (2025), which proposed a “3D framework” that includes three axes: justice domains (distributive, procedural, recognition), dimensions of change (spatial, temporal, sectoral), and depth of transition (extent of systemic change). Norman's (2023) 10 essential actions for urban planning in response to climate change add substance to Eadson's framework, which encompasses a wide range of issues, from mapping climate risks to incorporating indigenous knowledge and practices for climate-resilient plans for the future.

Considering these framework and above discuss challenges Youth for Unity and Voluntary Action (YUVA), a Mumbai based NGO has pioneered Community Climate Action Plan (CCAP) — led by youth from the community including spatial mapping, focus group discussions (FGDs), key informant interviews (KIIs), the methodology demonstrates how legal invisibility becomes a mechanism of exclusion from climate adaptation and planning, deepening both chronic and climate-induced precarity (Nuggehalli & Parmar, 2025; Goswami A. & Parmar D., 2024; Drive B. & Shankar V., 2024).



Image 3.2: Youth mapping climate risk

Moreover, to develop a climate reliance city active citizen consultant and stakeholder participation is a must, which YUVA achieve through ‘Climate Parishad’, where diverse stakeholders including urban poor communities, farmers, civic officials, experts, and community groups came together to map vulnerabilities and propose solutions to the event examined the city's increasing exposure to floods, heat waves, and ecological degradation’ (Sah, 2025).



Image 3.3: Community engagement on understanding city landscape

This framework can be refined and strengthened by subjecting it to deliberation at multiple levels with a diverse range of stakeholders across global, national, and subnational levels. Additionally, it is timely for civil society actors and academic institutions to collaborate in further refining, reconceptualizing, and reimaging this framework to meet the needs of Indian cities.

Conclusion

India's urban climate agenda, as it advances towards a green economy, offers an opportunity to align economic growth with social inclusion. This transition has the potential to generate decent work while ensuring that no one is left behind (ILO, 2022). However, realizing this vision requires that policies on 'green skills' move beyond generic employment creation to focus on targeted education and vocational pathways. Green jobs often demand higher levels of technical and cognitive skills, and unless deliberate strategies are adopted, the benefits of greening may exclude the people most at risk. Vulnerable youth, particularly those outside formal education and training systems, need financial and institutional support to manage the short-term costs of transition (UN DESA, 2018). Consequently, integrating equity into the design of green economy policies, by addressing structural inequalities and recognising climate justice as both social and caste justice (Kashwan, 2025), is fundamental to achieving transformative outcomes.

GREEN JOBS OFTEN DEMAND HIGHER LEVELS OF TECHNICAL AND COGNITIVE SKILLS, AND UNLESS DELIBERATE STRATEGIES ARE ADOPTED, THE BENEFITS OF GREENING MAY EXCLUDE THE PEOPLE MOST AT RISK.

To make climate action both effective and equitable, policy approaches must move beyond siloed, technocratic interventions. Collaborative frameworks involving city governments, youth groups, and marginalized communities are essential to embed inclusivity in urban climate governance. A strategic policy development that integrates youth participation is particularly urgent, given that up to 35% of India's GDP could be eroded by 2050 (Stiell, 2025), potentially lowering living standards for nearly half of its population (World Bank, 2018). In this context, the ILO's (2016) framework for a Just Transition provides a valuable guide for coherence across nine policy domains, i.e., macroeconomic management, industrial and sectoral development, enterprise growth, skills formation, occupational safety and health, social protection, active labour market measures, labour rights, and social dialogue. Embedding youth participation across these domains is vital to ensure that transition processes are both informed by, consulted with and responsive to the realities of young people.

The Just Urban Transition (JUT) framework reinforces this imperative by positioning youth as agents of structural and systemic transformation. By creating urban spaces that are casteless, gender-just, and participatory, the JUT approach enables climate action that is both socially rooted and forward-looking. Yet, operationalizing this vision requires deeper empirical engagement and sustained research. As Hughes and Hoffman (2020) argue, "[G]iven the increasing centrality of cities to lives and livelihoods around the world, the growing inequality in our cities, and the real and potential leadership of city governments on climate change, the JUT agenda is critical and timely."

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GLIMPSES FROM A TRIBAL VILLAGE IN MADHYA PRADESH

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Image 4.1: TERI team visiting High School in Bhogaikhapa for plantation drive

It was a peaceful afternoon that we spent at Bhogaikhapa, a tiny tribal hamlet in the Betul district of Madhya Pradesh. The sun was still fierce at 4 o'clock, and the village square buzzed with well-worn routine. A dozen or so men sat clustered on a *chabutara*, playing cards, while some clusters of children, barely fifteen or sixteen, were busy playing a round of marbles.

We were there to conduct a livelihood orientation session under TERI's People Centric Transition (PCT) Project, an initiative designed to build alternative livelihood opportunities for communities dependent on coal and related economies. About thirty women had gathered, curious, hopeful, and eager to understand what our visit was about. Interestingly, while the male members

remained where they were playing cards and marbles within the view, the women filled the courtyard with questions, anticipation, and an energy that reflected both aspiration and resilience.

One woman, during the discussion, said she never went to the block headquarters in Ghoradongri, hardly a few kilometres off. Only one out of nearly thirty women there had ever gone. For most, the world went only as far as Bagdona, which was the next larger village.

That picture of aspirational women, yet constrained by limited opportunities, lingered in my mind. Later, when I encountered a successful corporate entrepreneur, an IIT Delhi pass-out who attributed her success only to hard work. She emphasized how working hard alone will

make you have a good career and how some individuals simply don't want to work and continue blaming about the challenges and hurdles. I couldn't help but reflect on the women of Bhogaikhapa, as hardworking, but being limited by opportunity. The dialogue made me recall that achievement is not merely a matter of individual drive; it is a matter of access, mobility, and opportunity. In those contrasting images lie a greater truth: opportunities and privilege determine futures as much as individual effort.

The photo of those boys lingering around marbles during the afternoon could easily be tempting to judge, "they don't want to work." The truth, however, is more intricate. In Betul's coal belt, economies are based on coal mono-economy for generations. When mining receded, it also left behind not only ecological wounds but an economic void. The young generation here now find themselves at a crossroads, torn between disappearing livelihoods and the uncertainty of what is to be.

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Why Rural Youth in a Just Transition?

India's vision for energy transition from fossil fuel-driven growth to low-carbon, sustainable paths is not only a technological or policy change; it is social transformation. For this transition to be 'just', it would have to address the livelihood, aspirations, and agency of communities which have had to depend on carbon-intensive economies for generations.

Rural youth are at the core of this transformation. They are both the most vulnerable and the most influential forces of change. As India becomes increasingly diversified in terms of its economy, rural youth cannot be left behind as it diversifies towards renewable energy,

sustainable agriculture, and green enterprises.

According to the 2011 Census of India, approximately 48% of India's population is in the working-age group (15–59 years), and much of this group lives in rural India. India will have close to one-fifth of the world's working-age population, with a median age of nearly 29 years, in 2030 (UNFPA, 2023). This "demographic dividend", the economic potential created by a large working-age population is both a blessing and a duty.

But if this youth potential goes unskilled, unemployed, or underemployed especially in rural and transition areas the dividend can be quickly transformed into a demographic burden. Empowering rural youth through skills development, entrepreneurship, and access to new livelihood ecosystems is therefore critical for a just and inclusive transition.

As Dr APJ Abdul Kalam once stated, "The lighted mind of the young is the strongest resource on earth, above earth and below earth." To tap into this resource involves investment in education, innovation, and level playing field opportunity particularly in rural India.

The People Centric Transition Project: Bridging Policy and People

TERI's People Centric Transition (PCT) Project in the Ghoradongri block of Betul district embodies this philosophy. The closure of coal mines in the Pathakhara region has triggered deep socio-economic shifts in villages such as Chhattarpur, Shobhapur, and Bhogaikhapa. The PCT project seeks to operationalize the 'Just Transition Framework' by creating locally viable, inclusive, and sustainable livelihood alternatives.

The 'Just Transition Framework approach' focuses on:

- **Participatory local governance and community ownership** through capacity development of local stakeholders.
- **Youth and women entrepreneurship, re-skilling, and skill development.**
- **Gender-inclusive planning and participation** in livelihood activities.
- **Renewable energy, sustainable agriculture, women entrepreneurship, and zero-emission schools** initiatives.

During my internship in the project, I have studied community needs assessments (CNA) which was carried



out using focus group discussions, in-depth community interviews and socio-economic household survey. These exercises enabled us to identify local priorities, skill gaps, and livelihood aspirations. The findings from these exercises served as the basis for developing suitable interventions.

To enhance grassroots-level engagement, Community Resource Persons (CRPs) were recruited from among the villages. These locally trained representatives serve as the important links between the implementing group and community members, enabling communication, mobilization, and confidence-building. The project also worked in close liaison with Panchayati Raj Institutions (PRIs) to help converge with government programmes and generate institutional support for long-term sustainability.

Challenges on the Ground

The initial phase of the project uncovered a number of structural and behavioural issues common to rural economies in transition:

1. **Limited Skill Base:** Most rural youth did not have access to training in line with new sectors like renewable energy, digital services, or agri-value addition.
 2. **Socio-cultural Barriers:** Patriarchal gender norms tended to limit the movement and decision-making of women, thus confining their involvement in training and enterprise.
 3. **Economic Dependence on Coal:** Local identity and livelihood had been centred around mining for decades. Breaking the mono-economy mentality to transition into diversified livelihoods required economic as well as psychological changes.
 4. **Low Institutional Trust:** Being a new organization working in the area, TERI had to spend a lot of time building rapport with communities and local governance systems. There was skepticism in the beginning, which eventually gave way to cooperation through continuous interaction.
 5. **Migration and Underemployment:** Young people who could not get regular employment at home migrated seasonally to neighbouring cities for low-income, informal work.
- **Community-Centric Planning:** Engaging young people and women in planning created ownership and longer-term commitment. Participatory approaches guaranteed that interventions were based on local realities instead of top-down assumptions.
 - **Skill Development and Livelihood Diversification:** Skill gap assessments enabled the identification of potential sectors like sustainable agriculture, microenterprises, renewable energy maintenance, and digital literacy where rural youth could be trained or re-skilled.
 - **Strengthening Local Institutions:** Training and linkage of PRIs and SHGs (Self-Help Groups) strengthened the local governance ecosystem to sustain interventions through post-project cycles.
 - **Gender Empowerment and Sensitization:** Women's engagement was not just encouraged but institutionalized via SHGs and CRPs. Gender sensitization workshops helped in tackling social barriers, focusing on the economic roles of women.
 - **Building Trust through Presence:** Field visits, communication with the community members, capacity building sessions fostered the community's confidence in the project's purpose over time.

Reflections: Linking the Local to the Global

Work on the PCT project provided a glimpse into how global initiatives find expression at the local level. The "Just Transition" narrative much debated in policy circles or COP forums gains substance only when viewed through the mundane experiences of such communities as Bhogaikhapa.

Fundamentally, a 'Just Transition' is ensuring that the transition to sustainability does not increase inequality. It's whether change benefits, or can benefit, whom, and who may be left behind. Rural young people are not mere recipients of this change; they are its most essential partners.

Pathways for a Just and Inclusive Transition

In spite of these setbacks, the following promising pathways came out of the field experience:

JUST TRANSITION IS NOT SIMPLY A MATTER OF SUBSTITUTING ONE SOURCE OF ENERGY FOR ANOTHER IT IS A MATTER OF VISIONING ALTERNATIVE LIVELIHOODS, INSTITUTIONAL BUILDING, AND EMPOWERING PEOPLE.



Initiatives such as PCT illustrate that just transition is not simply a matter of substituting one source of energy for another it is a matter of visioning alternative livelihoods, institutional building, and empowering people. It is also a reminder that gender inclusion and youth engagement are not marginal but core to sustainable development.

Conclusion: Turning Potential into Progress

India is at a crossroads. With more than 65% of its population under the age of 35 (UNDP, 2023), India possesses one of the world's biggest youth populations a demographic premium unequalled in size. But the real dividend will be realized only when this vigour, particularly from rural India, is directed towards innovation, productivity, and inclusive growth.

The path to a fair transition is complicated, but its success depends upon people-making the journey a people-centric process—where local communities are not just beneficiaries but players in creating change. The learning from Betul reminded us that change starts with listening, establishing trust, and collectively creating solutions that capture local context.

AS INDIA'S ENERGY TRANSITION GAINS MOMENTUM, RURAL YOUTH INVESTMENT THROUGH EDUCATION, VOCATIONAL TRAINING, AND DEMOCRATIC GOVERNANCE IS WHAT WILL ENSURE THAT OUR DEMOGRAPHIC DIVIDEND LEADS TO JUSTICE AND SUSTAINABILITY, AND NOT A MISSED OPPORTUNITY.

As India's energy transition gains momentum, rural youth investment through education, vocational training, and democratic governance is what will ensure that our demographic dividend leads to justice and sustainability, and not a missed opportunity. For in villages such as Bhogaikhapa, Chattarpur and Shobhapur the unspoken dreams of its youth and women are not tales of transition but rather the potential of India's just and sustainable future.



BEYOND THE PRESENT: NAVIGATING INTERGENERATIONAL EQUITY IN INDIA'S JUST TRANSITION DISCOURSE

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Image 5.1: A man carrying large quantity of illegally pilfered coal which he will transport for 50-70 kilometres to sell it at marginal profit

Overview

The transition away from the fossil fuel-based energy system towards a low-carbon, clean and sustainable future inevitably affects a wide array of stakeholders, including workers, industries, local communities, and civil society (Pandey & Kumar, 2025). Among these, future generations, particularly the youth, emerge as a critically important constituency. Ensuring that their interests are meaningfully integrated into present energy transition policies is central to the principle of intergenerational

equity. This requires not only safeguarding young people from bearing a disproportionate share of the adverse consequences of greenhouse gas emissions but also enabling them to actively shape pathways towards a just and sustainable energy future. The youth are not merely the passive receptors of the long-term consequences of today's policy choices. Rather, they constitute active agents whose participation, aspirations, and capacities are integral to shaping just and sustainable transition pathways.



FUTURE GENERATIONS, PARTICULARLY THE YOUTH, EMERGE AS A CRITICALLY IMPORTANT CONSTITUENCY. ENSURING THAT THEIR INTERESTS ARE MEANINGFULLY INTEGRATED INTO PRESENT ENERGY TRANSITION POLICIES IS CENTRAL TO THE PRINCIPLE OF INTERGENERATIONAL EQUITY.

Projected Coal Demand

As part of the study titled “Study on Optimal Strategy for Phasing Down Coal Uses in India” funded by the Ministry of Coal, the authors conducted a modelling exercise to derive future coal demand using the TIMES-VEDA model (Kumar et al., 2025).

Figure 1 illustrates coal demand across four scenarios, which are REFS, CONS-EFF, CONS-DMN, and CONV/CCUS. The REFS is a business-as-usual path. It assumes that India will mostly continue with its current energy policies and practices, without significant policy changes. The CONS-EFF (Efficiency) emphasizes the use of better technology and appliances (like energy-saving bulbs, efficient machines and modern pumps, etc.) to deliver the same level of service while consuming less energy. The CONS-DMN (Demand Management) approach involves structural and lifestyle changes that directly lower energy demand. For instance, shifting freight transport from road to rail and promoting material circularity in industries. The CONV/CCUS scenario combines renewable energy expansion and carbon capture. It focuses on replacing fossil fuels with solar, wind, nuclear, biofuels and electrification (Kumar et al., 2025).

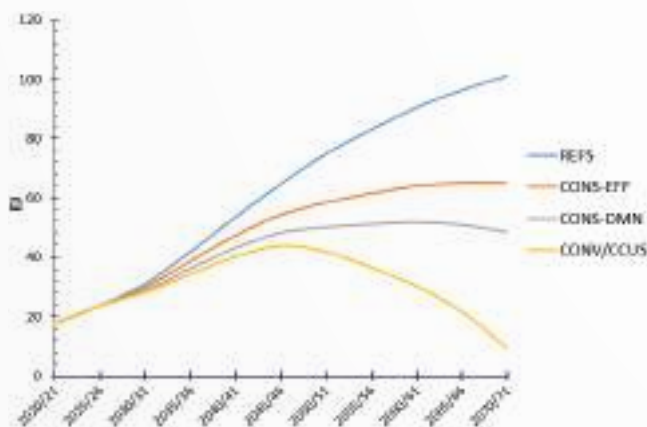


Figure 1: (Image 5.2): Total coal demand under different scenarios

Figure 1 demonstrates that India's coal demand converges towards a peak around 2045-46, though the magnitude and subsequent trajectories diverge depending on policy and technological pathways. This juncture can be interpreted as a critical inflection point for both energy planning and social policy, particularly when assessed through the lens of a just transition and intergenerational equity.

The projected peak around the mid-2040s signals that current developmental choices will determine the ecological and economic inheritance of today's youth and unborn generations. If coal demand continues along the reference pathways (REFS), future generations will inherit a carbon-intensive economy, constrained ecological space, and heightened climate risks. Conversely, the CONV/CCUS and CONS-DMN trajectories embody the ethical imperative to reduce ecological harm, ensuring that subsequent generations inherit a sustainable environment and more resilient economic structures. The projected peak of coal demand around 2045-46, as illustrated in Figure 1, not only signals the beginning of the coal phase down but also frames a decisive policy window within which India must act to safeguard both present livelihoods and future generations.

Navigating Intergenerational Equity Within a Just Transition

The intergenerational equity is considered one of the central pillars of a just transition. It emphasizes the distributive justice between the present and the future generations. It is grounded in the recognition that the future generation possesses the same right to a good life as those living today, a life undisturbed by the temporal damage caused by the current energy systems (David, 2018; Sovacool & Dworkin, 2015). This principle of

IF POLICYMAKERS AND PLANNERS DELAY ACTION, THE BURDEN OF ADJUSTMENT WILL DISPROPORTIONATELY FALL ON FUTURE GENERATIONS, WHO WILL INHERIT NOT ONLY AN UNSTABLE LABOUR MARKET BUT ALSO THE COMPOUNDED ENVIRONMENTAL COSTS OF PROLONGED COAL DEPENDENCE.

intergenerational equity imposes a moral responsibility on the present generation to ensure that today's youth and future cohorts inherit an environment no worse than that which we received from our predecessors (de Looze et al., 2024).



Image 5.3: Children eating mid-day meal in an Anganwadi centre in Sundargarh, Odisha

The projected peak of coal demand around 2045-46, as indicated in Figure 1, provides a critical temporal marker for shaping India's energy transition. The trajectory highlights a critical two-decade window for India to prepare for the social and economic consequences of declining coal use. From an intergenerational equity perspective, this period must be utilized to establish new industries and employment opportunities that can absorb the workforce likely to be displaced from the coal sector. If policymakers and planners delay action, the burden of adjustment will disproportionately fall on future generations, who will inherit not only an unstable labour market but also the compounded environmental costs of prolonged coal dependence. Conversely, by strategically managing this transition now, through skill development, diversification of the regional economies and promotion of clean energy industries, India can safeguard livelihoods in the present while ensuring that future generations inherit a more sustainable, equitable and resilient energy system.

Challenges for Intergenerational Equity in India

The pursuit of intergenerational equity in India's coal-dependent regions is constrained by a complex set of economic, social and institutional challenges. Foremost among these is the entrenched reliance on coal for livelihoods, which risks widespread unemployment and income loss as demand declines post-2045, in the

absence of diversified regional economies or robust alternative industries. Limited educational opportunities and persistent skill mismatches further hinder the ability of younger generations to transition into emerging sectors, reinforcing cycles of dependency on coal-based employment. The lack of alternative livelihood options exacerbates outmigration, unemployment, and social vulnerabilities, often leaving behind communities with weakened social cohesion and limited resilience (Pandey et al., 2025). In addition to material insecurities, the psychological burden of uncertainty in transitional economies manifests as anxiety and loss of intergenerational aspirations, particularly among youth confronted with diminishing prospects in their home regions. These socioeconomic strains are compounded by the ecological degradation caused by mining, such as air pollution, groundwater depletion, and deforestation, which diminishes the environmental inheritance of future generations. Institutional shortcomings, including inadequate welfare systems, weak re-skilling initiatives, and policy frameworks that privilege short-term coal revenues, further entrench these vulnerabilities. Unless addressed through forward-looking policies and investments in education, healthcare, skill development, and sustainable industries, coal regions risk becoming sites of intergenerational inequity, where both economic insecurity and environmental degradation are passed on to future generations.

Conclusion

The projected peak in India's coal demand by the mid-2040s underscores a decisive temporal window for advancing a just transition that is attentive to the principle of intergenerational equity. The comparative scenarios demonstrate that the policy and technological choices made in the present will critically shape whether future generations inherit a carbon-intensive, insecure economy or a sustainable and resilient energy system. Addressing the challenges of coal-dependent regions, such as job displacement, persistent skill mismatches

THE PROJECTED PEAK IN INDIA'S COAL DEMAND BY THE MID-2040S UNDERSCORES A DECISIVE TEMPORAL WINDOW FOR ADVANCING A JUST TRANSITION THAT IS ATTENTIVE TO THE PRINCIPLE OF INTERGENERATIONAL EQUITY.



and ecological degradation, requires strategically oriented investments in regional diversification strategies. Only through such proactive interventions can India simultaneously mitigate the social and economic disruptions of coal decline, safeguard the livelihoods of current communities, and ensure that future generations inherit an environment and economy capable of sustaining human well-being. While technological transitions can be engineered with relative ease, the transformation of societies remains far more complex and demands sustained, inclusive and context-sensitive interventions.

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FROM OPPORTUNITY-RECIPIENTS TO CO-DESIGNERS: YOUTH AS SHAPERS OF TRANSITION PLANNING

Aishwarya Sharma, Assistant Manager, Vasudha Foundation



Image 6.1: Young women in Giridih present their work after completing training in stitching and tailoring

Introduction

In India's climate and energy plans, the word 'youth' often appears in the last. A closer look at various climate or energy policies reveals a pattern. Youth feature as targets of interventions, not as architects of solutions;

as future beneficiaries rather than present planners. The spotlight is on them in skill development plans, in livelihood training programmes, seldom in stakeholder consultation lists. However, they are absent from the planning committees, resource allocation bodies, and governance structures where transition pathways are



actually designed. This is reflective of a deeper structural problem about how India designs policy.

Despite having the world's largest youth population with over 65% of its 1.4 billion people under 35¹, the country's ongoing transition planning adopts and reproduces the same top-down, expert-driven and exclusionary approaches that plague development planning. The consequence? A bizarre contradiction, i.e., planning for a future inhabited primarily by today's young people, without systematically involving them. This represents a fundamental governance flaw.

Inadequate mechanisms for incorporating knowledge, priorities, ambitions and capacities of affected youth lead to outcomes which are although technically sound yet risk being socially harsh, or even overly ambitious.

Reframe 'Who Governs?' - Case for Youth as Transition Planners

The case for youth participation is primarily based on intergenerational equity principles. In order to optimally utilize the demographic dividend, the need of the hour is that instead of viewing youth as recipients of opportunities, we need to view them as co-designers of transitions.

The more substantive case for it rests on competencies and knowledge. State agencies know policy frameworks but often have weak ground-level intelligence about local energy consumption patterns, informal livelihood networks, and community willingness to adopt new technologies. Also, young Indians understand emerging livelihoods, digital tools, as well as local aspirations in ways that traditional planning processes often miss. All of these are important aspects where the capacities of youth can be leveraged immensely.

So far, India's just energy transition debate has mostly focused on workers, vulnerable communities, industries, and finance but the planning process itself remains bureaucratic and technocratic. Thus, it is time to also highlight the aspects where procedural justice principles could be enhanced further. The discourse runs deeper and goes beyond jobs. It is not merely about hearing or acting towards their voices but, more importantly, it is about transferring, building and fostering the 'agency' of transition planning.

¹ Deo, P. (2023, February 2). Is India's rapidly growing youth population a dividend or disaster? The Times of India. <https://timesofindia.indiatimes.com/india/is-indias-rapidly-growing-youth-population-a-dividend-or-disaster/articleshow/97545222.cms>

Hurdles for Youth Engagement

The barriers which limit youth's entry to the policy-shaping and decision-making table are multifaceted:

- **Legitimacy:** In India's governance ecosystem, legitimacy to participate in formal planning derives from institutional affiliation, electoral mandate, or technical expertise. Youth collectives often lag behind on these fronts. The institutional architecture creates no entry points for non-institutional actors to exercise decision-making authority.
- **Data Integration:** Official planning relies on specific knowledge forms such as quantitative datasets, feasibility studies, or critical and analytical research in standardized formats. Youth knowledge, even when diverse and in-depth, rarely conforms to these formats. Their knowledge remains unintegrated with official planning, often considered anecdotal rather than evidence-backed. Also, data ownership remains concentrated with the government, leaving communities without access to information necessary for informed participation.
- **Resources:** Effective participation requires sustained organizational capacity on the aspects of coordination, infrastructure, documentation systems, technical support, resources for representation and more across multiple planning forums. Currently, civil society grants access to such resources through established NGOs, however, youth per se rarely have access to this machinery. State youth schemes also focus on individual entrepreneurship, not organizational infrastructure for collective action.
- **Technical Mentorship Gap:** Young people engaged in energy mapping, cooperative organizing, or community mobilization need specialized support for GIS training, financial planning, legal guidance on organizational structures, understanding of regulatory frameworks. This mentorship infrastructure barely exists, especially in the current educational systems. While technical institutions and innovation labs support youth on startups for scalable business models, similar avenues for community-based initiatives do not exist.
- **Consultant-Driven Planning:** Planning remains fundamentally top-down since roadmaps are drafted by specialized firms hired through state procurement, responding to commissioning agencies' priorities which may be influenced by electoral cycles, departmental mandates, and stakeholder interests.



Learning from Global Counterparts

There are several global interventions where youth have played a central role in shaping policies on energy transitions and climate governance, offering valuable lessons for India. Countries make use of different models of engagement using youth assemblies, participatory councils, hackathons, energy cooperatives, and national climate forums to embed youth perspectives into energy transition planning and implementation.

4.1 Europe (Slovakia, Spain, Poland, Greece)²

- In Greece, Active Youth in Florina (a local association that mobilized youth from major cities) was invited to become a member of the monitoring committee of the national just transition plan and were given voting rights similar to other members.
- In the Netherlands, the Province of Groningen has a permanent Youth Advisory Council that is consulted on policy matters. During the drafting of the Territorial Just Transition Plans in 2021, youth representatives from the Council participated in public consultations with local stakeholders.³ However, reports hint at the tokenistic nature of these consultations since the draft plan was presented to them during consultations and owing to technical nature, meaningful feedback could not be given.⁴
- Hackathons in Bulgaria engaged high school and university students to co-design local start-up proposals for transition challenges, combining learning with hands-on innovation.
- Surveys were conducted in Slovakia and Spain to understand youth's position on the future of the Just Transition Fund (JTF) regions. These surveys, followed by workshops, gave youth a direct voice and opportunity to shape just transition plans.

4.2 United Kingdom

- In Nottingham, a youth-led Climate Assembly was created in response to a report on youth climate anxiety. A youth panel co-designed the assembly (selecting themes, experts, and the programme) and

over a weekend, participants produced a manifesto adopted by local institutions. The city council committed to continued collaboration with the youth committee, though it did not establish a formal youth representative body.⁵

- Ireland established the National Youth Assembly of Ireland in 2022. It serves as an ongoing structure where young people (ages 12-24) feed into national policy (Climate Action Plan), including an annual Youth Assembly on Climate.⁶

4.3 Kenya

- Kenya's legislation⁷, Climate Change Act, mandates representation of youth in the Climate change council to participate in the policy-making processes.⁸

Insights for India



Image 6.2: Women participating in a tailoring session

Adapting these learnings to India means fostering innovation, legitimacy, and intergenerational equity in India's journey to net zero.

- **Structured Participation:** Youth participation must be planned, resourced, and sustained through institutional mechanisms, not just invited as one-off consultations.

2 Assalini, S., & Cigüt, T. (2023, November). Integrating youth into the just transition process: A case study highlighting good practices. Directorate-General for Regional and Urban Policy, European Commission. https://ec.europa.eu/regional_policy/sources/funding/just-transition-fund/case-study-integrating-youth-into-the-just-transition-process.pdf

3 Ibid.

4 Generation Climate Europe & Bankwatch Network. (2022). Report on youth engagement in the just transition. <https://gceurope.org/wp-content/uploads/2022/05/Report-on-Youth-Engagement-in-the-Just-Transition-1.pdf>

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7 Kenya. (2016). Climate Change Act, 2016 (as amended). In Climate Change Laws of the World. https://climate-laws.org/document/climate-change-act-2016_7078

8 Warlow, A. (2024, August 12). On International Youth Day, we are keeping youth in focus — How four countries engage youth on policy, climate, and energy. Student Energy. <https://studentenergy.org/international-youth-day-2024/>

YOUTH PARTICIPATION MUST BE PLANNED, RESOURCED, AND SUSTAINED THROUGH INSTITUTIONAL MECHANISMS, NOT JUST INVITED AS ONE-OFF CONSULTATIONS.

- **Innovative participatory models:** For youth engagement, the avenues and entry points into shaping policies need to be innovatively designed.
- **Capacity Building:** Providing mentorship, capacity-building programmes, and digital tools increases the quality and impact of youth engagement.
- **Equitable Representation:** Assigning voting rights or formal monitoring roles to youth entities in governance addresses tokenism, shifting youth from recipients to co-designers.
- **Bottom-Up Innovation:** Engaging youth in localized energy cooperatives, hackathons, and digital forums encourages ownership and social resilience.
- **Inclusivity:** Policies must actively reduce barriers for youth especially marginalized youth, ensuring climate action and energy transition benefits reach all sections of society.

Conclusion

A tokenistic approach to active youth involvement risks alienating a generation that must live the consequences of today's planning decisions. Without new and innovative governance mechanisms backed by sufficient resources, youth cannot generate the documentation and sustained engagement models. Planning processes will then continue to exclude youth, not because their knowledge is irrelevant or limited, but because governance structures lack mechanisms to legitimize it. The country's demographic dividend will peak around 2041, creating an unprecedented but time-limited opportunity to harness youthful energy and innovation for systemic change. Leveraging it and empowering youth as local transition planners, not just beneficiaries, can make energy governance more democratic, data-rich, and socially responsive.

EMPOWERING YOUTH AS LOCAL TRANSITION PLANNERS, NOT JUST BENEFICIARIES, CAN MAKE ENERGY GOVERNANCE MORE DEMOCRATIC, DATA-RICH, AND SOCIALLY RESPONSIVE.



FROM COALFIELDS TO CLEAN FUTURES: EMPOWERING INDIA'S YOUTH FOR A JUST TRANSITION

Chaitanya Baruah, Senior Manager, Developer Group



Image 7.1: Overburden next to coal mines in Sundargarh, Odisha

Under India's ambitious net-zero by 2070 pledge, the most defining question is no longer whether we can decarbonize fast enough, but whether our young citizens, especially in coal geographies, will be equipped to lead and benefit from this upcoming shift. With around 65% of the country's population under 35, India's demographic advantage can either propel its clean energy future or become a missed opportunity if youth remain excluded from the gains of green growth.

Coal continues to be much of India's economic base. Coal India Limited, the world's largest coal producer, employs roughly 2.15 lakh workers directly, while millions more depend on mining-linked jobs, according to government data and industry reporting. In states like Jharkhand, Odisha, and Chhattisgarh, entire districts rely on coal royalties and contractor networks for livelihoods. The move towards renewables, though necessary for meeting India's Paris and Glasgow commitments, risks



destabilizing these regional economies unless the transition deliberately creates new pathways for young workers.

As several reports, including one by Reuters summarizing a World Bank assessment, have pointed out, South Asia's employment generation has not kept pace with its working-age population growth. The warning is blunt: the demographic dividend can quickly turn into a demographic burden. Coal regions face this tension acutely. On one side, mines are expected to mechanize or decline; on the other, youth in those same areas lack the technical and financial access to join India's clean-energy industries.

National programmes like Pradhan Mantri Kaushal Vikas Yojana (PMKVY) are the main source to contest this gap. Since 2015, government figures cited by *The Indian Express* show over 1.6 crore trainees have been enrolled. Yet, outcomes remain contested. A ministerial statement put placement rates at around 43% in earlier phases, but more recent analyses by *the Economic Times* that include non-tracked cohorts under PMKVY 4.0 found fewer than 15% had secured verifiable employment. The divergence highlights a deeper issue: most training modules remain detached from actual market demand in emerging sectors such as solar O&M, EV maintenance, and battery assembly.

The gender dimension is even more worrying. According to The Indian Express's coverage of Periodic Labour Force Survey (PLFS) data (August 2025), female youth unemployment stands at 25.7% in urban areas and 14.3% in rural India, despite modest improvements in overall participation. In coal districts, where women are overrepresented in informal and subsistence work, that translates into entire communities excluded from transition opportunities. Without gender-sensitive skilling, mobility support, and safe working conditions, a "just transition" will remain a slogan rather than a lived reality.

Still, there are signals of what works. City-level and state-led initiatives are showing measurable demand for green jobs. Delhi's updated Electric Vehicle (EV) policy, for

instance, is projected to create nearly 20,000 new jobs. These range from battery-swapping technicians to fleet managers and charging station operators. Such city-level demand corridors could become employment pipelines for trained youth from mining states, if local skilling ecosystems align curricula with real job descriptions.

At the national level, the clean-energy sector's employment potential is equally clear. Industry estimates suggest that India's renewable energy sector could employ over one million people by 2030, up from roughly 1.1 lakh today. The majority of these roles will be in installation, operation, and maintenance — areas ideally suited for youth apprenticeships and skill transitions. For every gigawatt of solar or wind capacity added, thousands of technician-level positions can be generated, provided state skill missions, Industrial Training Institutes (ITIs), and industry partners coordinate their planning.

The story of the coal states themselves is also shifting. Jharkhand is highly interested in developing Just Transition frameworks that envision diversification into green manufacturing, forestry, and services. Analysts note that District Mineral Foundation (DMF) funds, which currently accrue from mining royalties, could be channelled to finance renewable clusters, youth incubation centres, and start-up accelerators focused on low-carbon technologies. Done right, these would not be subsidies but strategic reinvestments in future livelihoods.

There are practical steps that could turn policy intent into outcomes. One is the immediate launch of apprenticeship-linked skilling pilots in at least twenty coal-district ITIs and polytechnics, co-designed with the EV and solar industries. Another is a credit-linked microenterprise window for youth to operate last-mile energy services such as maintaining solar irrigation pumps, managing rooftop systems, or servicing rural charging depots. A third is a gender-responsive training package with women-only cohorts, transport stipends, crèches, and links to Self-Help Group (SHG) credit specifically for women aged 18–29 in mining-affected blocks.

Policy coherence remains crucial. A national Just Transition framework that links the Ministries of Coal, Power, Skill Development, Labour, and Women & Child Development would provide a unified direction for both training and employment outcomes. Financing must move from fragmented CSR projects to blended models—combining District Mineral Funds, green bonds,

WITHOUT GENDER-SENSITIVE SKILLING, MOBILITY SUPPORT, AND SAFE WORKING CONDITIONS, A "JUST TRANSITION" WILL REMAIN A SLOGAN RATHER THAN A LIVED REALITY.



YOUTH WILL TRUST THE TRANSITION WHEN THEY SEE MEASURABLE RESULTS SPECIFICALLY, HOW MANY ARE TRAINED, HOW MANY ARE PLACED, WHAT THEIR WAGES ARE, AND WHAT THEIR RETENTION RATES ARE AFTER ONE YEAR.

and international climate finance to scale inclusive skilling and entrepreneurship.

Perhaps most importantly, transparency must anchor the process. Youth will trust the transition when they see measurable results specifically, how many are trained, how many are placed, what their wages are, and what their retention rates are after one year. The credibility of India's Just Transition depends on the young people who find stable livelihoods in that transition. When a young woman in Dhanbad earns a certificate that leads to a solar O&M job, or when a group of ITI graduates in Angul open a start-up assembling EV battery packs, India's demographic dividend begins to compound rather than erode.

In the end, the demographic dividend and the energy transition are not two separate narratives they are the same story written from different directions. One looks at the future of work; the other at the future of the planet. If policy can bring them together through coherent planning, verifiable data, and targeted investment, India's youth can turn the Just Transition from a policy paper into lived progress. The numbers — from 3.37 lakh coal jobs to one million green ones — are daunting, but they also define the promise of a generation ready to work for a cleaner, fairer India.

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THE DUAL IMPERATIVE AND THE ETHICS OF INDIA'S COAL TRANSITION

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Image 8.1: Illegally gathered coal lying next to tools used by locals

Introduction: Growth, Restraint, and the Justice Blueprint

India has reached an inflection point in history, faced with an urgent dual imperative at once aspirational and accountable. The first is developmental: fulfilling the vision of Viksit Bharat 2047 via sustained economic growth and job creation. The second is an ecological one: to see the national commitment of reaching Net Zero

emissions by 2070 realized. Redoing these trajectories will require a deep re-imagining of the fundamentals of industrial growth, for coal is still the basis of over seventy percent of India's power generation (MoSPI / ET EnergyWorld, 2024; Reuters, 2025) and supports livelihoods across more than a third of its districts (Mongabay-India, 2021).

So the coal transition as it unfolds is not a technical swap of fuels, but a civilizational negotiation between



the Real (the material economy in extraction) and the Symbolic (the institutional grammar of sustainability). Its improper management could aggravate unemployment, environmental destruction and social disunity. When well-managed it can turn vulnerability into capability, and create avenues for youth empowerment and ecological restoration (TERI, 2023).

An integrated justice framework anchored in Amartya Sen's Capability Approach, combined with psychoanalytic and spatial theory, offer a conceptual framework to interpret this transformation. In a similar vein to Lacan's three-dimensional schema of the Real, the Symbolic, and the Imaginary (and with a supplementary Existential dimension as inspired by Derrida's concept of the Spectre of Loss), India's transition can be regarded as a multi-layered process of material, institutional, relational, and moral reconfiguration (Anandajit Goswami, 2024).

The Normative Core: Capabilities, Agency, and Desire

Justice is described in the Capability Approach as the maximization of people's substantive freedoms (the capability sets), the capacities that enable them to lead lives they value (Sen, 1999). Energy is an instrumental capacity that allows for mobility, security and productivity. But freedom depends on being able to make choices using resources that matter. In the coal regions, structural deprivations (low levels of education, insecure tenure, caste hierarchy, and limited political voice) constrict that menu.

Ensuing young people to accept this means a just transition must thus extend human agency. As psychoanalysis suggests, agency emerges where desire finds new symbolic coordinates. Programmes for re-skilling, higher education, and entrepreneurship in the fields of renewable energy, manufacturing clusters, and digital innovation can give these coordinates (Brookings India, 2021; NITI Aayog, 2023). To want differently, to imagine oneself as a creator of value rather than a victim of closure, is the first act of justice.

The Real Lens: Livelihoods and Material Security

The Real is what stands in opposition to being represented: dust, fatigue and uncertainty that plagues mining towns. The transition sparks fear of abandonment among millions whose daily bread depends on coal. Mechanisms that can anchor material security include

the DMF (District Mineral Foundation), created under the Mines and Minerals Act 2015. Nevertheless, audits show underutilization, and low community involvement (CSE, 2021). The 2025 National DMF Workshop of the Mines Ministry advocated that DMF spending be placed in line with just-transition priorities, e.g., livelihood diversification, health and education (Mines Ministry, 2025).

MGNREGA should be extended to coal-producing lands to create an interim source of income. Concurrently, district training hubs and incubation centres can train the youth for emerging green sectors, such as solar panel maintenance, and sustainable construction. WRI India (2025) advises the combination of DMF with state employment missions, so that reskilling takes root in a full market absorption. Improving PHC and mobile clinics might reduce the chronic respiratory and orthopaedic diseases common to mining sites (TERI, 2023). The material basis of dignity lies in this continuity of life.

The Symbolic Lens: Institutions, Law, and Policy Coherence

The Symbolic means the space for law and those institutions that organize recognition. India's informal workers are mostly beyond this terrain and therefore not exposed to formal schemes and social insurance (TERI, 2023). Justice begins with naming. A broad worker census and identity cards would confer legal visibility, but would also make eligibility for welfare and training possible. Formation of Just Transition Cells at the state and district levels with representatives from workers, local administrations and industry can embed participation within governance (TERI, 2023).

It is also important to find coherence in financing architecture. Centralization of DMF, corporate social responsibility (CSR) funds and climate finance under one roof could create a more seamless investment process. As Modak et al. (2024) contend, blended public-private mechanisms are the key to unlocking India's demographic dividend. Policy thus becomes both the syntax and the conscience of transformation.

The Imaginary Lens: Identity, Gender, and Community Engagement

The Imaginary deals with how communities see themselves and each other. In coal towns, social identity



forms a part of the mine (its rhythm of work, danger and community). When extraction stops, meaning disappears and a void takes over. This haunting absence where livelihoods vanish but the psychological architecture persists is captured in Derrida's Spectre of Loss (Anandajit Goswami, 2024).

This must be compensated for by the kind of inclusive storytelling and participation we need: Recognition Justice. Women are disproportionately on the receiving end during this transition: unpaid childcare, social insecurity and increased home stress (TERI, 2023). Gender equitable livelihoods programmes, micro-credit networks and self-help groups can translate recognition into agency.

IN COAL TOWNS, SOCIAL IDENTITY FORMS A PART OF THE MINE (ITS RHYTHM OF WORK, DANGER AND COMMUNITY). WHEN EXTRACTION STOPS, MEANING DISAPPEARS AND A VOID TAKES OVER.

Securing land and forest rights under the Forest Rights Act secures assets and legitimacy for tribal and forest-dwelling populations. By building on both technical planning and oral histories in public forums and youth councils, the Imaginary rupture might be turned into a new collective narrative of purpose and pride.

The Existential Lens: Innovation, Education, and Ecological Repair

The Existential dimension shifts from mourning to rebuilding. Mining regions should not just close pits but also re-open the possibility. Experiments in Odisha's Angul and Chhattisgarh's Korba show that reclaimed mine land can be used for solar parks and light manufacturing units (TERI, 2023). Projects like these represent what psychoanalysis refers to as sublimation, the shift of loss into creativity.

These initiatives must embrace education and entrepreneurship. Community colleges with sustainable energy, waste management and agro-innovation in their curriculums can weave ecological repair into the fabric of human well-being. DMF-enriched incubation centres could offer support to fledgling small companies in renewables logistics and eco-tourism.

The economic repair has to go in tandem with the social repair. Supporting counseling, art-collectives and youth clubs give space for re-symbolization; they allow communities to discuss a shared future. As the landscape heals, so too does the psyche of the place.

Global Responsibility and the Open Future

India's Long-Term Low Emissions Development Strategy (LT-LEDS) envisions the coal transition in an ethic of fairness and inclusiveness (Modak et al., 2024). But schemes such as the Carbon Border Adjustment Mechanism (CBAM) could turn down the decarbonization burden onto developing economies. Real climate justice necessitates funding streams that enhance capabilities instead of adding new dependencies.

At the domestic level, convergence with DMF, Just Transition Cells and national climate finance platforms for coherence (WRI India, 2025). Internationally, partnerships should focus on technology transfer, vocational training and concessional finance. The moral horizon of the Indian coal transition is therefore planetary: to reconcile responsibility with right and growth with grace.

Success in bringing this transition forward will be judged not solely by gigawatts, or tonnes avoided, but by lives reimagined. When youth in former mining regions can be agents, find employment, and re-inhabit the land with dignity, India's dual imperative will have its ethical resolution.

WHEN YOUTH IN FORMER MINING REGIONS CAN BE AGENTS, FIND EMPLOYMENT, AND RE-INHABIT THE LAND WITH DIGNITY, INDIA'S DUAL IMPERATIVE WILL HAVE ITS ETHICAL RESOLUTION.

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INTERGENERATIONAL LABOUR, EQUITY, AND THE POLITICS OF JUST TRANSITIONS

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Image 9.1: Feet of a coal mine labourer in Jharia, Jharkhand

Introduction

As the world races to decarbonize, justice in energy transitions is too often reduced to a tug-of-war over today's jobs and training funds and consequently overlooking the generations who will inherit the consequences. Intergenerational justice, however, introduces a crucial temporal dimension: choices made in the present shape not only current distributions but also the life chances of those who will inherit the future (Caney, 2016; Meyer, 2021; Thompson, 2010). Time

becomes the central currency of justice (González-Ricoy & Gosseries, 2016). This lens provokes a sharper question: will today's transition pathways leave children and young people more secure, or simply pass on a different form of uncertainty? The literature on intergenerational justice stresses that time, cumulative harms, and the political representation of future interests must be explicit parts of transition design if transitions are to be genuinely just (Skillington, 2019; Tremmel, 2009).

This temporal perspective intersects with a demographic one. Many low- and middle-income coal regions are



characterized by a large youth cohort entering the labour force (Nayak, 2020). This so-called demographic dividend will translate into real gains only if young people can access decent, durable work, along with equitable access to assets and voice (ILO, 2022; UNDP, 2016). Absent structural interventions that disrupt the mechanisms reproducing precarity, this same youth cohort risks becoming a generation of informal, insecure workers rather than a driving force of low-carbon prosperity (Nayak, 2020; Delina, 2021).

This article therefore asks: How can intergenerational justice shape youth policy to turn the demographic dividend into a driver of just transitions?

Field evidence from Nayak (2023) study on India's Talcher coalfields provides a stark empirical illustration of how industrial development can create enduring intergenerational entanglement with an extractive economy (Nayak, 2020). In villages acquired for mining, formerly agrarian livelihoods were largely displaced: in one district-level contrast cited in fieldwork, cultivators fell from 68.3 % (1981) to roughly 6.4 % of workers by 2011, while the local economy re-oriented towards mining and mine-induced industries (Census of India, 1981, 2011). In many households the first generation obtained some compensation or formal employment, but the second generation increasingly subsisted on informal, contractual, and casual work linked to the coal ecosystem rather than stable, asset-building opportunities (Nayak, 2020).

Youth as Proxies and Institutional Anchors of Intergenerational Justice

A key conceptual challenge in intergenerational justice is the “non-identity problem”: future persons will be shaped by today's choices, and may not exist under alternative scenarios, making direct obligations complex (Parfit, 1976; Meyer, 2017). However, contemporary theorists argue this does not absolve present actors of responsibility (González-Ricoy & Gosseries, 2016; Caney, 2014). Instead, it necessitates principle-based policy design, precautionary measures, and durable institutional arrangements that can safeguard opportunities for future cohorts (Tremmel, 2009; Thompson, 2010). This aligns strongly with the idea of a “just savings principle” in political theory, ensuring resource use and policy pathways do not foreclose future well-being (Rawls, 1971/1999).

IN PRACTICE, YOUTH ARE OFTEN TREATED AS LEGITIMATE PRESENT-DAY PROXIES FOR FUTURE GENERATIONS: THEY HAVE THE MOST TO GAIN OR LOSE FROM TRANSITION CHOICES

Operationalizing this ethical obligation requires proxy representation, since future generations cannot directly participate in decision-making (González-Ricoy & Gosseries, 2016; Tremmel, 2009). In practice, youth are often treated as legitimate present-day proxies for future generations: they have the most to gain or lose from transition choices and will inhabit the world shaped by these policies (Skillington, 2019; Meyer, 2017). This proxy role is reflected in energy justice literature, which argues that youth participation in transition governance is not merely consultative but normative and democratic (Delina, 2022; UNDP, 2016).

In the context of energy transitions, we can identify five intergenerational justice principles that offer a practical governance framework (Caney, 2016; González-Ricoy & Gosseries, 2016; Tremmel, 2009):

- Inclusive decision-making - ensuring affected groups, especially youth, meaningfully shape transition pathways.
- Youth participation - embedding youth representation in transition institutions, not just one-off consultations (UNDP, 2016; ILO, 2022).
- Principle-based policy-making - aligning transition policy with justice principles such as precaution, sustainability, and rights (Page, 2006; Meyer, 2017).
- Institutional representation - creating durable mechanisms like youth seats, ombudspersons, and intergenerational councils (González-Ricoy & Gosseries, 2016; Tremmel, 2009).
- Sustainable resource use - ensuring resource decisions today preserve environmental and social capital for future cohorts (Rawls, 1971/1999; Caney, 2014).

Youth are not just a target group for skilling programmes or employment interventions; they are political stakeholders in their own right (Delina, 2022). Integrating them meaningfully into policy design, resource allocation, and monitoring systems creates a bridge between intergenerational justice theory and just transition practice (Skillington, 2019; González-Ricoy & Gosseries, 2016).



YOUTH ARE NOT JUST A TARGET GROUP FOR SKILLING PROGRAMMES OR EMPLOYMENT INTERVENTIONS; THEY ARE POLITICAL STAKEHOLDERS IN THEIR OWN RIGHT

Looking into an Empirical Case: Intergenerational Labour in Talcher Coalfields

The Talcher coalfields in Odisha are emblematic of how industrial development projects can create long-term intergenerational labour dependencies (Nayak, 2020). The establishment of mining operations led to rapid land-use transformation. Agrarian communities were dispossessed of land through acquisition for collieries and industrial facilities, triggering a structural shift away from agriculture as the primary livelihood source (Lahiri-Dutt, 2012). Mining and mining-induced industries became the central economic drivers, creating a local labour economy deeply dependent on extractive activity (Nayak, 2020; Lahiri-Dutt, 2007).

The intergenerational dimensions of this shift are crucial. The first generation of displaced landowners often received some form of compensation, either in the form of cash, limited formal employment in collieries, or land-for-land arrangements for select groups (Nayak, 2020). But over time, formal job opportunities contracted sharply due to outsourcing, mechanization, and contractualization of mine operations (ILO, 2022). As a result, the second generation found itself increasingly reliant on informal, insecure work within the coal economy - truck driving, wage labour, scavenging, or ancillary service jobs (Nayak, 2020; Lahiri-Dutt, 2012).

This intergenerational dependency is not evenly distributed. Caste and gender intersect to shape who benefits and who remains locked out (Deshpande, 2011; Nayak, 2020).

- a. Dalit households, being largely landless at the time of acquisition, received little or no compensation and were overrepresented in the informal workforce (Nayak, 2020).
- b. Upper-caste households were more likely to have received formal jobs or business opportunities linked to mining contracts (Nayak, 2020).
- c. Women's work was systematically rendered invisible; they were concentrated in unpaid reproductive labour,

informal casual work, and low-paid tasks such as coal collection or head-loading (Lahiri-Dutt, 2012; Lahiri-Dutt & Mahy, 2006).

This has profound implications for intergenerational mobility. Young men and women from Dalit and lower-income households are effectively locked into informal labour circuits, unable to access either land or stable formal employment (Deshpande, 2011; Nayak, 2020). Young women face additional barriers to skilling programmes and entrepreneurship due to gender norms and unpaid care work burdens (ILO, 2022; Lahiri-Dutt & Mahy, 2006).

Policy and Institutional Gaps in Advancing Intergenerational Justice



Image 9.2: Sacks filled with illegally gathered coal in Jharia, Jharkhand

The persistent immobility of labour across generations in transition regions underscores the limits of narrow, supply-driven “reskilling” interventions (Nayak, 2020; Lahiri-Dutt, 2012). While training and education programmes are often promoted as pathways to transition readiness, they frequently lack (a) alignment with local economic realities, (b) clear employment or enterprise pathways, and (c) targeted measures for marginalized groups (ILO, 2022; Skill Council for Green

Jobs, 2023). As Nayak highlights, without confronting structural inequities and generational power dynamics, such interventions risk remaining superficial rather than transformative (Nayak, 2020).

A core governance gap is the absence of structured youth voice in transition planning. Although intergenerational justice is rhetorically acknowledged in policy discourse, it is rarely institutionalized through youth representation, monitoring frameworks, or advisory structures (González-Ricoy & Gosseries, 2016; Skillington, 2019). In coal-dependent regions such as Talcher, transition decisions continue to be taken without the formal inclusion of the very generation whose livelihoods are most affected (Nayak, 2020).

This governance vacuum is reinforced by India's fragmented transition architecture. Initiatives on skilling, renewable energy expansion, coal sector restructuring, and labour operate largely in silos across ministries (ILO, 2022). There is no coordinated mechanism to embed youth representation in decision-making at the state or district levels. Compensation, resettlement, and livelihood planning remain top-down and projectized rather than systemic (Nayak, 2020; Lahiri-Dutt, 2012). Consequently, transition initiatives are often implemented as isolated projects rather than as durable, intergenerational frameworks (Caney, 2014; González-Ricoy & Gosseries, 2016).

Intergenerational justice is referenced in energy and labour policy documents through keywords like "youth participation" or "sustainability," but these remain symbolic (UNDP, 2016; ILO, 2022). There are no formalized mechanisms such as youth quotas in transition bodies, intergenerational advisory councils, or funding frameworks tied to intergenerational metrics. This absence matters: institutionalizing intergenerational justice can shift transitions from short-term interventions to long-term, inclusive development pathways (Page, 2006; Tremmel, 2009). Without this, as the Talcher case illustrates, the demographic dividend remains 'untapped'; youth are treated as passive beneficiaries of training or compensation rather than active co-architects of future economies (Nayak, 2020; Delina, 2022).

Comparative experiences underscore a design gap in transition governance: institutions lack procedural justice mechanisms that (a) make youth genuine stakeholders, (b) enforce long-term accountability, and (c) integrate demographic and equity considerations into labour and energy planning (González-Ricoy & Gosseries, 2016; Skillington, 2019; UNDP, 2016). Bridging this gap

requires restructuring governance frameworks, aligning institutional design, financing, and representation with intergenerational justice principles (Caney, 2014; Tremmel, 2009).

The dominant supply-driven skilling model in transition regions provides generic technical training that is poorly linked to diversified local economies (ILO, 2022; Skill Council for Green Jobs, 2023). In Talcher, short-term training has not shifted the structural lock-in to informal, precarious work for second-generation youth (Nayak, 2020).

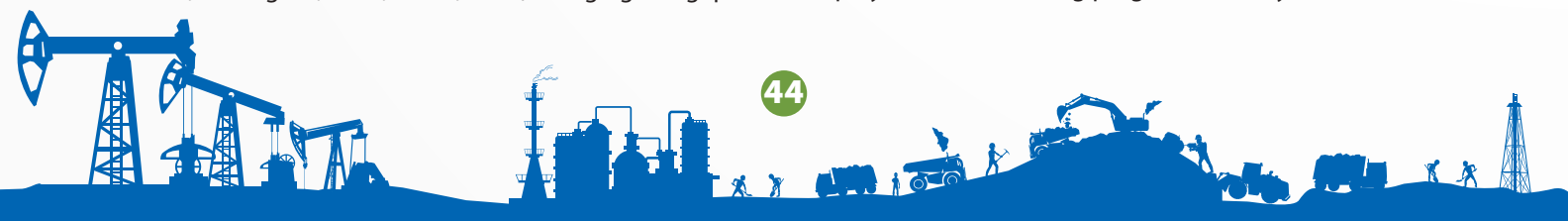
A place-based approach is needed: one that links skills programmes to actual and future local economic transformations (ILO, 2022; Delina, 2022). For coal regions, this means expanding pathways into:

- Renewable energy operations and maintenance linked to regional projects.
- Ecosystem restoration, agroforestry, and sustainable construction.
- Transport, logistics, and service enterprises tied to transition investments.

Yet, skills alone are insufficient. Training must be integrated with formal placements, enterprise incubation, and portable social protections, aligning with international just transition principles (ILO, 2022; Caney, 2014). Frameworks such as those of the International Labour Organization emphasize coupling active labour market policies with decent work standards and protection floors (ILO, 2022). Similarly, initiatives led by the Skill Council for Green Jobs demonstrate how blended financing, employer co-financing, and impact bonds can secure more stable job outcomes, particularly for women (Skill Council for Green Jobs, 2023).

Education systems in transition regions must also be reoriented to reflect climate literacy and green entrepreneurship (UNDP, 2016; Delina, 2022). This includes embedding climate and transition modules into curricula, establishing youth innovation incubators co-governed by industry and local institutions, and fostering intergenerational mentorship that links the skills of older workers with youth entrepreneurship (Skillington, 2019; Tremmel, 2009).

Finally, structural inequities around caste and gender shape who benefits from transitions. Nayak's Talcher study shows how Dalit households and women face systematic marginalization in compensation, employment, and training programmes (Nayak, 2020;



Lahiri-Dutt, 2012; Lahiri-Dutt & Mahy, 2006). Addressing these inequities requires targeted policy levers, including:

- Affirmative action in training and hiring through reserved seats, stipends, childcare, and mobility support (Deshpande, 2011; ILO, 2022).
- Participatory governance forums (youth councils, women's assemblies) at the district or block level (González-Ricoy & Gosseries, 2016; Skillington, 2019).
- Community benefit agreements guaranteeing local youth employment and enterprise access quotas (Delina, 2022; UNDP, 2016).

Policy Frameworks, Financing, and Accountability Mechanisms

The sustainability and equity of just transition measures ultimately depend on embedding intergenerational justice in policy design and financing structures (Caney, 2014; González-Ricoy & Gosseries, 2016; Skillington, 2019). This involves moving beyond rhetorical inclusion towards measurable, enforceable commitments.

A robust policy framework should include:

1. Transition funds with conditional disbursement, tied to youth employment, formalization, and equity metrics.
2. Mandated youth representation in transition bodies through advisory councils or ombudsperson structures.
3. Integration of long-term indicators such as parent-child occupational mobility and multi-year job retention in financing agreements.

Global models such as Just Energy Transition Partnership show how blended finance can support transition goals. However, these mechanisms need stronger social justice components and deeper local embedding. In India, such frameworks could be localized through state-level transition funds, earmarked for youth enterprise, targeted skilling, and long-term employment guarantees.

Traditional labour and energy indicators such as short-term job creation or training completions are inadequate for evaluating intergenerational justice. Instead, transitions must be assessed through temporal indicators that capture mobility, equity, and institutional voice over time (Tremmel, 2009; Meyer, 2017).

Recommended indicators include:

- a. Occupational mobility indices comparing parent and child cohorts in transition districts.

- b. 3, 5, and 10-year formal employment retention rates among trained youth.
- c. Gender- and caste-disaggregated data on access to transition jobs and enterprises.
- d. Institutional participation metrics, e.g., share of youth seats in local transition bodies.
- e. Asset access indicators, e.g., proportion of rehabilitated land or procurement contracts allocated to youth enterprises.

Embedding such indicators into financing and regulatory frameworks would make intergenerational equity both measurable and enforceable, ensuring accountability beyond electoral cycles. This temporal approach recognizes that just transitions are multi-decadal processes that must balance immediate livelihood needs with long-term structural change.

Youth-centred, justice-oriented transition pathways can convert India's demographic momentum into resilient, sustainable livelihoods. This requires a coherent governance, breaking ministerial silos, institutionalizing youth participation, linking skills to real economic opportunities, and embedding intergenerational indicators in financing frameworks. Doing so would transform India's transition process from fragmented, short-term projectization to a systemic, intergenerational development agenda.

Conclusion

The story of Talcher reflects a wider pattern: without deliberate action, energy transitions replicate inequities across generations. Intergenerational justice reframes this challenge, policies must anticipate harms, embed future safeguards, and institutionalize youth representation. Turning a youth bulge into a demographic dividend requires place-based skilling tied to real jobs, inclusive education, gender- and caste-sensitive strategies, and financing frameworks linked to intergenerational

TURNING A YOUTH BULGE INTO A DEMOGRAPHIC DIVIDEND REQUIRES PLACE-BASED SKILLING TIED TO REAL JOBS, INCLUSIVE EDUCATION, GENDER- AND CASTE-SENSITIVE STRATEGIES, AND FINANCING FRAMEWORKS LINKED TO INTERGENERATIONAL OUTCOMES.



outcomes. The choice is political: transitions can either entrench precarity or build temporal justice. Investing in youth as both agents and beneficiaries ensures future generations inherit not just the impacts of today's choices but the power to shape their own.

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SOCIO-ECONOMIC EFFECT OF COAL TRANSITION IN INDIA – NEED FOR A SAFEGUARD FRAMEWORK

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Image 10.1: Sacks filled with illegally gathered coal along the roadside in a village in Giridih

India is predominantly a coal driven economy. Coal constitutes close to 50% of total energy consumption. In 2023-24, 998 MT (Million Tonnes) of raw coal was mined in India. A total of 909 MT of non-coking coal was

despatched. Out of this 859 MT went to power sector alone (utilities and captive)¹. Power sector remains the major consumer of coal and driver of coal demand. Hence, any major change in this sector will have a

¹ Coal Directory of India (2023-2024)

huge effect on coal demand and mining. The electricity generation target for the year 2023–24 was fixed at 1750 BU comprising of 1324 BU from thermal power plants alone.² As per NEP (National Electricity Plan) 2022–32, the projection for electricity demand is likely to be 1907.8 BU for the year 2026–27 and 2473.7 BU for the year 2031–32. Thus, there is a steady growth projected in demand for electricity in the coming decades.

Coal is a dominant source of employment and revenues for states of Odisha, Chhattisgarh, Jharkhand, and Madhya Pradesh. Besides these states, coal is also mined in West Bengal, Assam and Maharashtra. Nearly 28 Public Sector and 18 Private sector companies are involved in mining across these states. The coal sector has historically been a labour-intensive industry, playing a crucial role in employment generation. Millions of workers are engaged directly in coal mining, transportation, and associated industries, while numerous indirect jobs depend on coal-driven economies. Over 69% of all coal mines are OCM (open cast mines) and at least 25% of the total workforce is directly employed in the mines.³ Hence a role of skill-based assessment of reallocation of these jobs to other sectors is imperative for a coal transition to happen in this country. This can further be validated by a projection of daily employment within the coal sector at the backdrop of technological advancement.

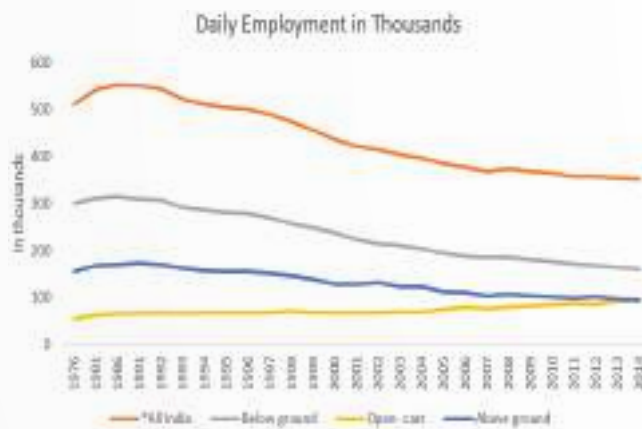


Figure 1: (Image 10.2) Historic data on daily employment in mines as reported in the Report on Statistics of Mines in India

While the renewable energy sector is growing rapidly and is anticipated to replace coal in meeting energy demand, it does not offer the same level of employment intensity as coal. Unlike coal mining, which requires a vast workforce for extraction, processing, and

WHILE THE RENEWABLE ENERGY SECTOR IS GROWING RAPIDLY AND IS ANTICIPATED TO REPLACE COAL IN MEETING ENERGY DEMAND, IT DOES NOT OFFER THE SAME LEVEL OF EMPLOYMENT INTENSITY AS COAL.

logistics, renewable energy—particularly solar and wind—relies more on technology, automation, and intermittent maintenance, leading to lower employment opportunities post-installation.

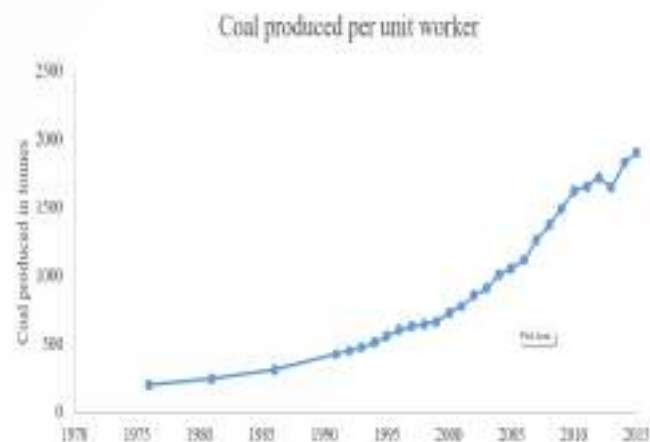


Figure 2: (Image 10.3) Coal produced per unit worker (historic data)

Additionally, coal-dependent regions have entire ecosystems built around mining activities, including small businesses, logistics services, truckers, industries, and informal labour markets that rely on coal workers' incomes. A direct transition from coal to renewables does not automatically absorb the displaced workforce, posing a serious challenge of structural unemployment in these areas.

Trend in Figure 1 illustrates the employment pattern in the coal sector between 1976 and 2015 which clearly indicates a steady decline in daily employment within the sector over the years. However, despite this decline in workforce numbers, coal production has significantly increased over the same period. Thus, output per worker in the coal sector has increased exponentially over the past 44 years. This suggests that the rise in output has not been driven by an increase in workforce size, but rather by adopting more advanced and efficient mining technologies. With continued technological advancements, such as automation, AI-driven resource optimization, and mechanized mining, the output per worker is expected to further increase in the future.

² Ministry of power, Power Sector at a Glance ALL INDIA (2023)

³ Coal Transition Odisha, a working paper (<http://nfi.org.in/sites/nfi/files/publication/Coal%20Transition%20-%20Odisha-11-11-22%20%281%29.pdf>)

This highlights two key issues: One the relatively lower labour intensity of RE sector and second the declining labour intensity of coal sector itself. Both these issues clearly indicate the likelihood of further job losses in the coal sector. Hence, a role of skill-based assessment of reallocation of these jobs to other sectors is imperative for a coal transition to happen in this country. This can further be validated by a projection of daily employment within the coal sector at the backdrop of technological advancement.

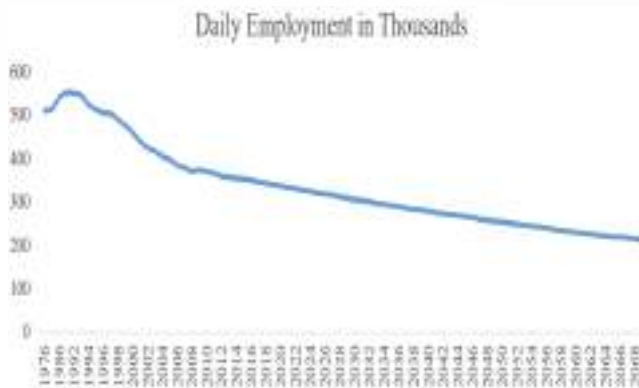


Figure 3: (Image 10.4) Projected employment trend in coal sector given the technological development

Therefore, policy safeguards need to be created for any potential job losses from coal transition in the future. The first question to ponder therefore is – “What can be the possible, potential, future employment multiplier effect for a coal transition in India?”. This is explored through a ACPET’s macroeconomic model exercise dealing with employment and coal production trade-offs, coal sector productivity from 1976–2015. The modelling exercise indicates that the employment multiplier effect of coal-based thermal capacity installation is 1.13. This implies that for every coal-based capacity unit reduction in the Indian Economy, employment will fall by 1.13 units. If the declining trend of employment productivity owing to the capital intensification of the sector and declining labour intensity of the coal production is included, the impact on employment from a coal phase down will be much higher

IF IN THE FUTURE, 1 UNIT OF COAL-BASED THERMAL POWER CAPACITY INSTALLATION IS REDUCED AND REPLACED BY 1 UNIT OF RENEWABLE-BASED CAPACITY, THEN THE NET DECREASE IN EMPLOYMENT IS MORE THAN 0.01.

than 1.13. At the same time multiplier effect of renewable energy on employment is 1.12. Therefore, if in the future, 1 unit of coal-based thermal power capacity installation is reduced and replaced by 1 unit of renewable-based capacity, then the net decrease in employment is more than 0.01. This increase further can be disaggregated into different segments of jobs based on skill profile as a future scope of investigation.

This rise in employment by 1.12, from the renewable energy sector means that if there is a 16% rise in installed capacity of renewables, it would lead to a rise of 18% in green job creation. This does not automatically translate to employment. The economy will need some time to realize the potential of job creation towards employment which needs to be further explored in a dynamic simulation in the future. Reskilling, training, relocation and rehabilitation of labour would require to be addressed for transition to employment. This entails that almost for this 18% increase in job creation from 16% rise in new renewable energy capacity which translates to 2.38 lakhs skilled and unskilled jobs in grid connected solar PV, 80,000 skilled and unskilled jobs in off grid solar, 52,000 new skilled and unskilled jobs in the wind sector, 35,000 new skilled and unskilled jobs in the liquid biofuels, 58,000 new skilled and unskilled jobs in solid biomass, 17,000 new skilled and unskilled jobs in solar heating and cooling, and 85,000 new skilled and unskilled jobs in the biogas sector that will be created. Over here, job creation and employment has been used interdependently.

ACPET’s model indicates that, at the current stage of the economy, replacing coal-based capacity with renewables yields minimal net economic benefit. The net impact on job creation is a slight loss of –0.01 (–1.13 + 1.12).

This situation has to be balanced by social safety nets, social security packages and minimum wages for these workers along with their reskilling, upskilling and rehabilitation if required as otherwise they will migrate or create a larger unorganized informalization. The state of Odisha has created such an integrated planning process where displaced coal workers can move into the other sectors of the economy through requisite skilling, reskilling processes. However, currently the informal workers of the coal sector are not sufficiently covered under the social security net. Many of the informal workers are employed in hazardous and exploitative conditions because there is little regulatory oversight. Even after the Unorganized Workers Social Security Act (UWSSA) went into effect in 2008, not much progress

had been made in developing accessible and efficient social security programmes for unorganized workers. The Code on Social Security, for the most part, largely borrows directly from the UWSSA and does not go into detail about the scope, nature, or funding mechanism of the social security schemes. In addition to this, there have been many commendable efforts to address the challenges that are being faced by informal workers and ultimately come out with solutions. The best thing India can adopt is the frequent conduction of national labour conferences related to coal phase down impacts on the labour, skill (if it happens) and other associated sectors so that the policymakers and the concerned stakeholders

would be aware of necessary policy changes that need to be implemented. The ILO has taken many initiatives considering the struggles that are being faced by the informal sector. In the Indian context, such a peripheral informalization might happen around the coal sector if the coal transition happens in the long term which however is not a likely possibility in the short term. Coal Transition for a net zero 2070 future might eventually be a reality beyond 2047. The country therefore needs to be prepared with proper safeguards to ensure procedural, recognitional and process justice for all coal sector communities and labourers around coal mines for such an eventuality in a distant future beyond 2047.



FINANCING INDIA'S DEMOGRAPHIC DIVIDEND

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Image 11.1: Smoke billowing from a brazier containing pilfered coal which will be used for cooking in Giridih

India's greatest asset, its youth bulge of nearly 65% of the population below 35,¹ is on a collision course with its global climate imperative. While the world rightly

cheers India's green energy revolution, the reality is that millions of livelihoods in the coal-dependent belts of eastern and central India face economic collapse. The

¹ Press Information Bureau, Government of India. (2025, February 1). India's Growing Focus on Youth and Sports. <https://www.pib.gov.in/FactsheetDetails.aspx?id=149107>

nation's demographic promise, a working-age group projected to peak around 2041,² is wholly contingent on creating stable, future-ready employment, a promise the fossil fuel phase-down directly threatens. A just transition is therefore a crucial issue of social equity and a vital economic security measure to prevent this youth dividend from becoming a societal debt. The core challenge is how to decarbonize the economy without derailing the demographic trajectory. This requires a just transition financing (JTF) framework that embeds inclusivity, fairness and opportunity into the financial ecosystem, going beyond traditional forms of financing, ensuring we invest in people as much as we invest in technology.

Globally, the rapidly evolving landscape of JTF is characterized by diverse financial instruments deployed by governments, multilateral institutions, and private investors. As of 2024, the sustainable bond market has surpassed \$5.3 trillion in cumulative issuance.³ This includes green bonds for financing renewable energy and resilient infrastructure, social and sustainability bonds for workforce retraining and community development, transition bonds, which, though still under 0.4% of total sustainable bond issuance,⁴ target hard-to-abate sectors, and sustainability linked bonds tying coupon rates to measurable social and environmental outcomes. Complementing these are blended finance instruments, where multilateral development banks (MDB) and development finance institutions (DFI) derisk high-risk environments through grants, concessional debts and guarantees, thereby attracting private capital to projects with both economic and social returns. The European Union's just transition mechanism exemplifies its approach, combining grants, concessional loans and guarantees through the European Investment Bank to support retaining local enterprise development and clean infrastructure in regions such as Silesia in Poland and Moravia in the Czech Republic.

Instruments such as outcome-based financing, which tie financial disbursements to verified achievements

of social and environmental milestones, include social and development impact bonds, pay-for-result frameworks, and performance-based contracts. These instruments further strengthen the ecosystem by ensuring accountability and measurable outcomes. The World Bank's programme-for-results, for instance, links lending to independently verified milestones such as the successful redeployment of a workforce or the completion of community resettlement. Globally, outcome-based financing instruments have mobilized over \$120 billion over the past fifteen years, though only a fraction explicitly targets just transition objectives.⁵ Projects such as Komati Power Station in South Africa and ACEN's Managed Transition Vehicle in the Philippines illustrate the potential of this approach, linking funding to socially impactful outcomes, dedicated funds, and localized mechanisms form the foundation of this approach, while verified working retraining and Small and Medium Enterprise development ensure that climate goals align with livelihood security.

In India, SEBI's 2025 Framework for ESG Debt Security expands sustainable finance beyond traditional green bonds to include social, sustainability, and sustainability-linked bonds, mandating third-party verifications, standardized disclosure norms, and global alignment. The BRSR framework enhances transparency in corporate environmental and social performance, while the forthcoming Climate Finance taxonomy classifies climate-aligned assets, including workforce retraining, renewable infrastructure deployment, and MSME support in coal regions. Priority sector lending adjustments under RBI guidance offer a channel to direct credit towards just transition objectives, increasing access for youth, upscaling, and regional economic diversification.

**PRIORITY SECTOR LENDING
ADJUSTMENTS UNDER RBI GUIDANCE
OFFER A CHANNEL TO DIRECT
CREDIT TOWARDS JUST TRANSITION
OBJECTIVES, INCREASING
ACCESS FOR YOUTH, UPSCALING,
AND REGIONAL ECONOMIC
DIVERSIFICATION**

2 Press Information Bureau, Government of India. (2019, July 4). Key Highlights of Economic Survey 2018-19. <https://www.pib.gov.in/newsite/printrelease.aspx?relid=191213>

3 Turhan, B. (2024, April 16). GSSS quarterly newsletter – Issue No. 7: Green, social, sustainability, and sustainability-linked (GSSS) bonds market update – April 2024. World Bank Treasury. <https://thedocs.worldbank.org/en/doc/2fa215f2779f95d970ef0601aa551cbc-0340012024/original/GSSS-Quarterly-Newsletter-Issue-No-7.pdf>

4 Pfaff, N., Altun, Ö., & Egorov, S. (2024, February 14). Transition finance in the debt capital market. International Capital Market Association (ICMA). <https://www.icmagroup.org/assets/Transition-Finance-in-the-Debt-Capital-Market-paper-ICMA-14022024.pdf>

5 Organisation for Economic Co-operation and Development. (2025, June 27). Outcomes-based financing in the new financing for development architecture: Lessons and opportunities for governments, development partners, and multilateral organisations (DCD(2025)9). [https://one.oecd.org/document/DCD\(2025\)9/en/pdf](https://one.oecd.org/document/DCD(2025)9/en/pdf)



The upcoming Social Stock Exchange, regulated by SEBI, is expected to democratize access to just transition-linked capital further, offering social enterprises and NGOs a transparent platform to raise funds for community-led transition projects. The Ministry of Finance, Coal, Environment, and Labor is reportedly developing frameworks to mainstream just transition governance and financing, including dedicated coordination bodies, regional transition plans, and fiscal initiatives for reskilling and industrial diversification.⁶

Furthermore, the existing set of central government initiatives already intersects with the objectives of just transition by promoting skill development, livelihood security, and youth engagement. The MGNREGA provides 100 days of guaranteed wage employment annually, supporting unskilled manual workers, which can be redirected towards climate-resilient infrastructure and ecosystem restoration. The Suryamitra Skill Development programme focuses on training youth for green jobs in the renewable energy sector, while the Pradhan Mantri Kaushal Vikas Yojana emphasizes skill certification and development in the clean energy domain.⁷

Despite these advances, financing the social component of transition remains inherently challenging. A key obstacle is the absence of a just transition definition and framework, which leads to fragmented investment and creates difficulties for lenders and investors in defining, classifying, and reporting on eligible just transition activities.⁵ Financial regulators such as the RBI currently prioritize climate risk but do not classify just transition as a material financial risk, leaving institutions without a mandate to integrate just transition principles into their lending strategies.⁴ Social impact verification remains inconsistent across instruments; while SEBI mandates third-party reviews, local auditing mechanisms capturing livelihood, health, and gender impacts are underdeveloped.

Ensuring a just transition for India's coal-dependent population requires innovative financing mechanisms that address social needs, which often lack the clear investment returns typically sought by private capital,

making them appear high-risk.⁸ Innovative finance in this context aims to increase the volume, efficiency, and effectiveness of financial flows by adapting existing instruments or introducing new approaches and partners to channel capital towards socially impactful outcomes. Establishing a national Just Transition Fund, modelled on the European Union's Just Transition Mechanism, could provide targeted support for economic diversification, workforce retraining, and public infrastructure investments in affected regions. Complementing this is the creation of a national just transition body for coal mining, which could mobilize domestic and international finances and allocate resources strategically to states undertaking just transition efforts. Existing instruments like the District Mineral Fund Foundation, funded by the mining royalties, could be leveraged to finance local skills deployment, education, and healthcare initiatives.⁹ Corporate Social Responsibility funds from fossil fuel-dependent PSUs such as Coal India Limited and NTPC could be repurposed as credit guarantees or enhanced mechanisms for high-risk just transition needs.⁵ The green credit programme, launched in 2023, could be utilized by expanding credit categories to include the rehabilitation of coal mine-affected areas. If green credit programme incentivizes rehabilitation the resulting restored lands can then be used for alternative economic activities like sustainable tourism agriculture or pisciculture culture as seen in Chhattisgarh creating new jobs for local youth and workers.¹⁰

Furthermore, a sovereignty-backed platform like the National Investment and Infrastructure Fund Limited (NIIFL), with an asset base exceeding \$4.9 billion, can play a pivotal role in blending financing for a just transition. By leveraging concessional capital from MDBs, DFIs, and sovereignty partners, NIIFL helps de-risk instruments and attract private capital into renewable energy, industrial diversification, and sustainable infrastructure.⁵

Beyond dedicated funds, India can develop upon just transition bonds at both sovereign and corporate levels, building on the existing green and social bonds market. The social Stock Exchange platforms could facilitate

6 Upadhyay, G., & Jena, L. P. (2025, August 12). Financing an inclusive future: Building India's just transition ecosystem. Institute for Energy Economics & Financial Analysis. <https://ieefa.org/resources/financing-inclusive-future-building-indias-just-transition-ecosystem>

7 Chatterjee, R., & Swarnakar, P. (2023, April). Just transition and the youth: Addressing challenges and opportunities for India. Just Transition Research Centre, Indian Institute of Technology Kanpur. https://www.iitk.ac.in/JTRC/file/Just%20Transition%20and%20the%20Youth_JTRC%20IIT%20Kanpur_Brief%20Report_April%202023.pdf

8 Cholaayil, N. (2025, April 25). Financing a just transition in India. World Resources Institute India. <https://wri-india.org/perspectives/financing-just-transition-india>

9 Mitra, J., Singh, A., & Victor, A. (2023). Just transition framework for a sustainable future in India's coal mining regions. The Energy and Resources Institute (TERI). <https://teri.org/sites/default/files/2024-02/Just%20Transition%20Framework%20for%20a%20Sustainable%20Future%20in%20India%E2%80%99s%20Coal%20Mining%20Regions.pdf>

10 Upadhyay, G., Jena, L. P., & Selvaraju, S. R. (2025, July 7). Just Transition financing ecosystem: Stakeholder consultation report. Institute for Energy Economics and Financial Analysis. <https://ieefa.org/sites/default/files/2025-07/Just%20Transition%20Financing%20Ecosystem%20%281%29.pdf>



THE CONVERGENCE OF INDIA'S DEMOGRAPHIC DIVIDEND AND ITS CLEAN ENERGY TRANSITION PRESENT A DEFINING OPPORTUNITY, ONE THAT DEMANDS TRANSFORMATIONAL, NOT INCREMENTAL, POLICY DESIGNS.

exclusive social bonds for a just transition to fund workforce retraining and community resilience.⁶

India should scale up result-based financing and impact bonds. India's own 14.4 million scale skill impact bonds, launched by the National Skill Development Council, retrained 50,000 individuals, with 60% women, demonstrating the potential to finance critical retraining activities.¹¹ Similarly, projects like Ayana Power's skill programmes, in Rajasthan and Maharashtra ushered phase outcome linked funding including the support from DFIs to train youth in renewable energy skills successfully certifying and employing 70%–75% of participants including many women's exemplifying the RBF principles show how result-based funding principles can successfully certify and employ youth, including women, in the renewable energy sector.¹²

The convergence of India's demographic dividend and its clean energy transition present a defining opportunity,

one that demands transformational, not incremental, policy designs. A credible Just Transition strategy must move beyond fragmented initiatives towards a coherent national framework integrating climate, finance, and social equity objectives, establishing a nationally recognized definition of Just Transition, embedded within climate and sustainable finance policies. To translate ambition into impact, India must scale financing through dedicated windows, state-level allocations, and private sector partnerships, particularly to empower MSMEs, informal workers, and coal-dependent regions. By marrying financial innovation with social protection, India can not only ensure a fair and equitable transition but also position itself as a global leader in socially responsive decarbonization.

BY MARRYING FINANCIAL INNOVATION WITH SOCIAL PROTECTION, INDIA CAN NOT ONLY ENSURE A FAIR AND EQUITABLE TRANSITION BUT ALSO POSITION ITSELF AS A GLOBAL LEADER IN SOCIALLY RESPONSIVE DECARBONIZATION.

¹¹ Modak, P., Robins, N., Tandon, S., Muller, S., Subramanian, S., & Curran, B. (2023, February). Just Finance India: Mobilising investment for a just transition to net zero in India. Environment Management Centre Pvt Ltd, Grantham Research Institute on Climate Change and the Environment, & British International Investment. <https://justtransitionfinance.org/wp-content/uploads/2024/01/Just-Finance-India.pdf>

¹² Robins, N., Curran, B., & Selvaraju, S. R. (2024, May). Ayana – building a skills base for India's clean energy transition. Just Transition Finance Lab. https://justtransitionfinance.org/wp-content/uploads/2024/05/Just-Transition-Finance-Lab-case-study_Ayana.pdf



YOUTH, ENERGY AND JUST TRANSITION: HARNESSING INDIA'S DEMOGRAPHIC DIVIDEND

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Image 12.1: Children playing football in Jharia, Jharkhand

In Figure 1, Child (red) and elderly (blue) shares are shrinking and rising respectively, while the working-age share (yellow) grows and peaks in mid-century. India's unprecedented youth bulge is a short-lived opportunity. Nearly half of India's 1.4+ billion people are under 25 and the country's median age (~29) is decades lower than in aging economies. Economists warn that India's "demographic dividend" a multi-decade rise in the working-age share, will last only into the 2040s. Whether this window yields growth or social strain depends on deliberate policies. As one analysis cautions, without targeted investment in human capital and sustained growth, India's advantage "could just as easily turn into a disaster". In short, India's demographic dividend is conditional on the right enabling environment.

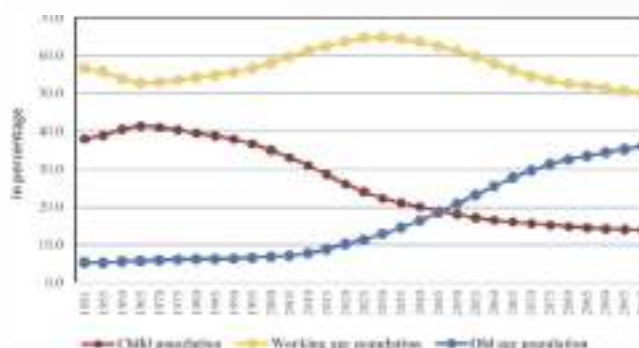


Figure 1 (Image12.2): Projected age composition of India's population (1951–2100)

Adapted from Jain, N., Goli, S., & Jana, A. (2025). Population age structural transition, demographic dividend and economic growth in India. *Humanities and Social Sciences Communications*, 12, 771. <https://doi.org/10.1057/s41599-025-05042-0>

India stands at a turning point. With nearly two-thirds of its population under 35, the country holds one of the world's largest pools of young people. This demographic dividend is often described as a once-in-a-century opportunity, but it is not automatic. Whether this youth bulge turns into growth or strain depends on how we invest in people and how well we connect education, energy and employment to the country's broader transition goals.

The conversation on just transition often focuses on coal, carbon and capital, but it is equally about people. India's young generation will carry the burden and promise of this transition. Their participation in new forms of work, especially in renewable energy, sustainable agriculture and local innovation, will decide whether the transition is fair and lasting.

INDIA'S YOUNG GENERATION WILL CARRY THE BURDEN AND PROMISE OF THIS TRANSITION. THEIR PARTICIPATION IN NEW FORMS OF WORK, ESPECIALLY IN RENEWABLE ENERGY, SUSTAINABLE AGRICULTURE AND LOCAL INNOVATION, WILL DECIDE WHETHER THE TRANSITION IS FAIR AND LASTING.

Education and Foundational Skills

Strong education systems form the base of any demographic advantage. The National Education Policy of 2020 tries to bring learning closer to life. It talks about early vocational exposure, stronger foundations in literacy and numeracy, and a mix of academic and practical learning. The idea is that by the time students leave school, they should already have basic skills that connect to real industries.

Universities are also beginning to adopt a more flexible and skill-based approach, encouraging interdisciplinary programmes that link technology with environmental and social awareness. Incorporating sustainability and energy concerns into these courses is a policy requirement but also a necessity for the future generation. An individual who grasps the clean energy

infrastructure and the climate change risk is in a better position to prepare for the future transition.

Training for the Energy Transition

In addition to education, mass skilling efforts have become the cornerstone of the youth policy in India. Efforts such as Skill India and the Pradhan Mantri Kaushal Vikas Yojana have skillfully trained millions of young persons. Yet the real question is not how many are trained, but how many find work that matches their training.

In recent years, new partnerships have begun to focus on green skills. Training centres under the Ministry of Skill Development, for instance, have introduced courses on electric mobility and renewable energy. These are not just add-ons but signs of a shift. When a student in a small town learns to maintain an electric vehicle or install a solar panel, it connects the idea of just transition to daily life. It shows that climate action can also mean job creation and dignity of work.

EFFORTS SUCH AS SKILL INDIA AND THE PRADHAN MANTRI KAUSHAL VIKAS YOJANA HAVE SKILLFULLY TRAINED MILLIONS OF YOUNG PERSONS. YET THE REAL QUESTION IS NOT HOW MANY ARE TRAINED, BUT HOW MANY FIND WORK THAT MATCHES THEIR TRAINING.

Building an Entrepreneurial Generation

The next challenge is turning job seekers into job creators. Initiatives like Startup India, Stand-Up India and the MUDRA scheme have provided a platform for young entrepreneurs to experiment. There are now over 90,000 startups in India led by first-generation founders. While tech is the most overwhelming segment here, climate and social enterprises that combine innovation and inclusion are gaining traction.

The technical institutes and universities are also gearing up through their centres of innovation and incubators. They have mentoring services, industry connections and early stage funding. But finance is a lingering



bottleneck. Many young entrepreneurs have ideas but limited collateral or credit history. Expanding access to small business credit, seed funds and public-private partnerships can make the difference between a good idea and a working enterprise.

Making Workplaces More Inclusive

Harnessing the demographic dividend also means addressing who gets to participate. India's female labour force participation remains among the lowest in the world. Until larger numbers of women discover decent employment, the overall potential labour pool will be underemployed. Recent efforts to expand maternity leave, encourage childcare centers and flexible employment are moves in the right direction but stronger social and workplace norms are required to bring inclusion to life.

The same goes for rural younger generations, Dalits and Adivasis, and the informal economy workers. Most of these are nearest to the impact of the disruption in the economy and closest to the effects of climate change but farthest from sources of opportunity. There are already legal and policy frameworks for their integration in India, but implementation gaps exist. Linking skill programmes, entrepreneurship funds and green livelihood programmes to local governance can bridge that gap.

These communities cannot be left behind while the country reduces its fossil fuel reliance. There need to be specific plans for a fair transition that include a clear path for the retraining of the workers from the carbon sectors and reinvestment in affected communities. For example, when the coal mines are reduced, the mining towns become hubs for renewable assembly like for the sun, agro-processing or digital services. Transition is technology but it's also a question of fairness.

Youth Financing and the Transition Process

Expenditure alone will not be enough without substantive investment. India presently spends around 2.5% of its GDP on education and just a fraction above 2% on healthcare. Both will have to steadily ramp up considerably if the Sustainable Development Goals are to be achieved. Increased budgetary spending on skills, research and home entrepreneurship are necessary if the demographic dividend is to deliver its possibility for macroeconomic influence.

New financing mechanisms are beginning to develop. The Skill Impact Bond is a good illustration. It converges the private investor base, training institutions and the government in a results-based framework where the investor is paid back only when trainees secure employment. This initial bond plans to train fifty thousand youth where the majority are females. This method ties the result to accountability and makes a guarantee that the funds directly address employability.

The big companies are also included in the funding pool through their CSR expenditure. Most are supporting skill centres, digital training centers and sustainability-focused youth fellowships. Multilateral banks and international partners have also gotten involved to co-finance vocational training and renewable energy projects. These partnerships reflect a wider understanding that youth development and climate transition cannot be separated.

At the local level, microfinance and self-help groups have shown what community finance can achieve. In several states, women's collectives have started small enterprises in solar energy, handicrafts and sustainable farming with the help of microcredit. Strengthening cooperative banks and digital payment systems can expand such examples. The goal should be to make finance available where talent exists, not only where investors already operate.

A Just and Youth-Led Future

India's demographic advantage is temporary. By the 2040s, the population will begin to age, and the current youth share will shrink. The next two decades will therefore decide how inclusive and sustainable India's growth path will be. A just transition, in this sense, is not separate from the demographic question. It is the answer to it.

The energy sector will be central to this story. Renewable energy, green transport, waste management and energy-efficient construction can all create new jobs if policy and finance align. But underlying the numbers is the larger question of whether the jobs are reaching the neediest. A change that gives power to rural youth, women and the poor will boost resilience for the economy and for social justice.

India's future lies in its young citizens. Equipped with the appropriate education, skills, and opportunities, they have the potential to lead the clean energy shift and make growth more inclusive. Without them, the best plans for the climate and the development will become inadequate. The demographic dividend is not a blessing



of numbers but a blessing of choices. If India makes the right choices, it has the potential to create an economy that is youthful and sustainable. If it waits for the wrong moment, the window will close.

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PHOTO ESSAY

TERI's initiatives for people centric transition in Betul, Madhya Pradesh

This photo essay seeks to highlight TERI's ongoing efforts to strengthen human capital and create sustainable economic opportunities for communities inhabiting the coal mining regions of Betul District, Madhya Pradesh. Through targeted programmes such as reskilling and upskilling, livelihood enhancement, and exposure initiatives, TERI aims to empower local residents, particularly youth and women, to participate meaningfully in the evolving low-carbon local economy and beyond. The essay captures stories of adaptability, learning, and transformation, reflecting how community engagement and capacity-building initiatives can pave the way for a just, inclusive and equitable transition in India's coal-dependent regions.

Skill Training Initiative: Stitching and Tailoring Centres in Chhattarpur and Shobhapur Gram Panchayats, Betul

As part of the broader focus on entrepreneurship and skill development for women in coal-dependent communities, the stitching and tailoring initiative aims to enhance women's employability and economic independence. Through gender-sensitive needs assessments and targeted training programmes, this initiative in the Chhattarpur and Shobhapur Gram Panchayats has equipped women with practical skills to explore self-employment and small-scale entrepreneurship opportunities, thereby fostering resilience and contributing to diversified local livelihoods.



Inauguration of Stitching and Tailoring Centre in Chhattarpur Gram Panchayat (Left) and Shobhapur Village (Right), Betul District (Madhya Pradesh)



Briefing by the TERI team at Stitching and Tailoring Centre in Chhatarpur Gram Panchayat, Betul District (Madhya Pradesh)



Beneficiaries with sewing machines at Shobhapur Gram Panchayat, Betul District (Madhya Pradesh)

Green School Initiative: Plantation Drives

Under the Green Schools Initiative, plantation drives were designed to promote environmental awareness and sustainable practices among students. By engaging schools in the three target Gram Panchayats of Shobhapur, Chhattarpur, and Bhogai Kapha, in tree plantation activities and linking them with lessons on waste management, hygiene, and environmental conservation, the initiative encourages students to take active roles in creating cleaner, greener, and healthier surroundings—both within their schools and in their wider communities.



Students carrying bamboo fences which will be used to protect young saplings during plantation drive in Chhattarpur village, Betul District (Madhya Pradesh)



A boy planting a sapling in Chhatarpur village, Betul District (Madhya Pradesh)



School children participating in the plantation drive in Shobhapur Gram Panchayat, Betul District (Madhya Pradesh).



Building the Future: Green Clubs and Student Mobilization for a Green Betul

This component of the Green Schools Initiative focussed on establishing Green Clubs to nurture environmental stewardship among young learners. By proposing interactive activities such as environmental quizzes, drawing competitions, and green walks, students will be empowered to become agents of change. The initiative strengthens school–community linkages and mobilizes youth participation towards building a greener and more sustainable Betul.



TERI team with school children in at the Government High School in Chhatarpur Gram Panchayat, Betul District (Madhya Pradesh)



TERI team with the staff and students of the Government High School in Shobhapur gram Panchayat, Betul District (Madhya Pradesh)



TERI team interacting with the student cabinet at Bhogaikhapa Gram Panchayat, Betul District, Madhya Pradesh



Green club members being taught the significance of renewable energy and sustainability at Chhatarpur Gram Panchayat, Betul, Madhya Pradesh

EVENT SPOTLIGHT: ADVANCING SUSTAINABLE COAL MINE CLOSURE AND REPURPOSING IN INDIA

August 21–22, 2025 | IIT (ISM), Dhanbad



India stands at a pivotal juncture in its energy transition, with over 40 coal mines scheduled for closure in 2025 and numerous legacy sites requiring structured planning. To deliberate on the opportunities and challenges of this transition, a two-day workshop on “Coal Mine Closure and Repurposing in India” was convened at IIT (ISM) Dhanbad under the EU–BMZ supported GIZ initiative—Application of Just Transition Principles in the Closure and Repurposing of Coal Mines in India—in collaboration with the Ministry of Coal and TEXMiN.

The workshop brought together a diverse mix of stakeholders including representatives from Coal India Limited (CIL) and its subsidiaries, the Coal Controller’s Organisation (CCO), Central Mine Planning and Design Institute (CMPDI), state governments, academia, civil society organisations, and community practitioners. It aimed to co-develop actionable pathways that move mine closure beyond a compliance exercise towards a people-centric and ecologically restorative process.



The discussions reflected India's evolving policy landscape, particularly the revised Mine Closure Guidelines (2025) that embed just transition principles, mandate district-level advisory committees, and emphasize livelihood diversification, social inclusion, and environmental regeneration. Participants explored how mine lands could be repurposed for agriculture, aquaculture, renewable energy, eco-tourism, and MSME development, linking local priorities to national sustainability goals.

Key sessions and takeaways included:

- Integrated Mine Closure Planning: Experts from CCO and CMPDI discussed the evolution of India's closure framework—from technical reclamation to integrated ecological and socio-economic planning.
- Ecological Restoration and Rehabilitation: Led by experts from IIT (ISM) and international speakers from Germany, this session focused on topsoil management, landscape integration, and ecosystem-based restoration approaches.
- Mine Waste and Water Management: Polish and Indian experts underlined the need for continuous water quality monitoring and innovative waste valorization.
- Repurposing Strategies and RECLAIM Framework: The session on the RECLAIM (Reviving Environment, Communities, Livelihoods Around Impacted Mines) framework showcased a structured, participatory model for planning post-mining land use, emphasizing inclusion of women, youth, and vulnerable groups.

The workshop concluded with remarks from Mr AK Rastogi, Chairperson of the Jharkhand Task Force for Sustainable Just Transition, and Mr Abhinav Jain, Project Director, GIZ, who highlighted the importance of multi-stakeholder collaboration and demonstration pilots to operationalize just transition principles.

On the second day, participants undertook a field visit to observe ecological restoration and repurposing practices on the ground, connecting discussions to practical realities. The collective insights have been synthesized into a White Paper on Coal Mine Closure and Repurposing in India, which lays out concrete recommendations for policy, financing, community engagement, and pilot interventions.





A young boy sitting on sacks of pilfered coal in Giridih, Jharkhand.

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