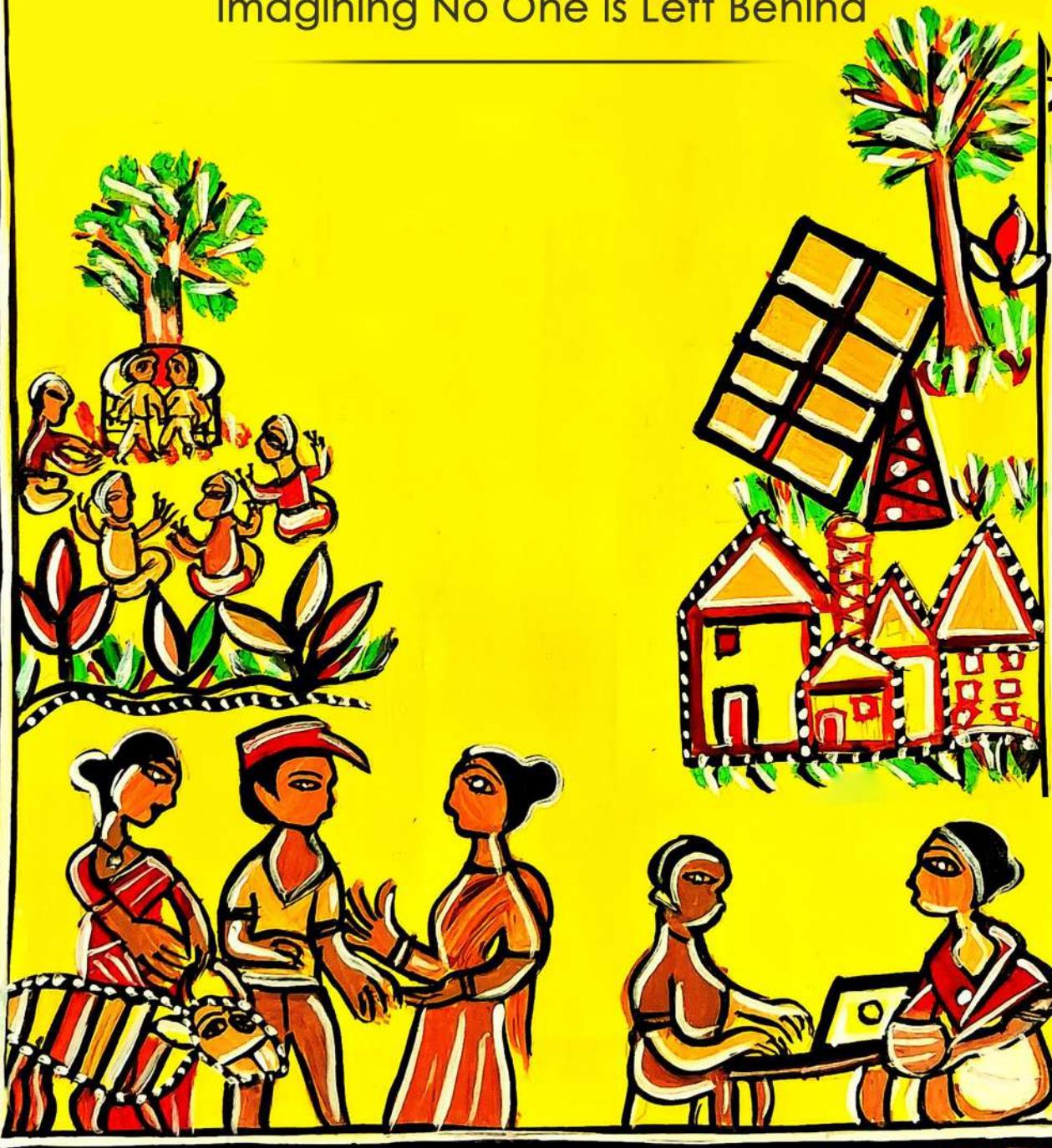




# Framework for Sustainable Just Transition

Imagining No One is Left Behind



### **About Task Force-Sustainable Just Transition, (Jharkhand)**

The Government of Jharkhand has constituted a Task Force on Sustainable Just Transition to align with national climate goals and chart low-carbon development pathways for the state. The Task Force aims to develop a comprehensive cross-sectoral state roadmap for the sustainable just transition by identifying innovative pathways to shift towards a non-fossil fuel-based energy ecosystem, proposing alternative livelihoods and emerging economic opportunities, and recommending forward-looking policy measures for a future-ready state.

Task Force-Sustainable Just Transition (GoJ)

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### **About CEED**

Center for Environment and Energy Development (CEED), an environment and energy group, is involved in creating sustainable solutions to maintain a healthy, rich and diverse environment. CEED primarily works towards climate resilience, energy transition, decarbonisation, circular economy, air quality, and sustainable mobility by creating an ecosystem that can scale up investments in low-carbon development pathways. CEED engages with industries, think tanks, stakeholders and the public to create environmentally responsible and socially just solutions. CEED is the Technical Partner of the Task Force-Sustainable Just Transition, Jharkhand.

Center for Environment and Energy Development (CEED)

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**This report has been prepared by the Center for Environment and Energy Development (CEED) under the guidance of Task Force-Sustainable Just Transition.**

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**Hemant Soren**  
Chief Minister



## Foreword

Jharkhand is at an important point in its journey, at which we are rethinking how we grow and develop. As a state, we are committed to Inclusive development. At the same time, it's important that our progress is climate-friendly and sustainable — that's where the idea of "just transition" comes in.

We've taken a major step by preparing a "Framework for Sustainable Just Transition". This will not only help in guiding Jharkhand's development, but can also inspire other states that are rich in natural resources.

This framework presents a complete, people-focused vision for long-term growth. It emphasizes climate resilience and fairness, making sure no one is left behind as we move forward.

Our plan builds on Jharkhand's rich natural resources and strong tribal roots. It supports national development goals and climate commitments, while encouraging industrial growth, better livelihoods, and an economy that is fair and ready for future.

Johar !

A handwritten signature in black ink, which appears to read "Hemant Soren".

(Hemant Soren)



अलका तिवारी, भा.प्र.से.  
Alka Tiwari, I.A.S.



मुख्य सचिव, झारखण्ड  
Chief Secretary, Jharkhand



## Message

Jharkhand has long played a crucial role in supporting India's energy security and industrial growth. The state is now strategically planning a transition towards a resource-efficient, climate-resilient, low-carbon and greener economy.

To advance further in this direction, the 'Framework for Sustainable Just Transition' developed by the Task Force on Sustainable Just Transition presents a forward-looking document that integrates social inclusion, ecological balance, and resilient economic approaches. For the first time, it also presents a comprehensive definition of Sustainable Just Transition.

The framework promotes inclusive strategies that support gender equity, social development, and a forward-looking economy, while opening new avenues for sustainable livelihoods, community empowerment, and long-term prosperity.

(Alka Tiwari)  
Chief Secretary



## Message



Jharkhand's proactive approach to energy transition provides a strong foundation for a greener future. This transition is not only about decarbonising the economy, but also about unlocking new economic opportunities, driving green industrial development, and fostering technological advancements.

As we transition to a low-carbon future, our efforts must go beyond merely reducing emissions. We must adopt a comprehensive approach to broader socio-economic development.

In this context, the Sustainable Just Transition framework offers actionable strategies that are tailored to Jharkhand's unique context. By integrating social equity, economic diversification, and environmental stewardship, we can ensure a holistic and sustainable pathway for our collective growth.

  
(Avinash Kumar)  
Additional Chief Secretary to Chief Minister  
Development Commissioner  
Additional Chief Secretary, Energy  
Government of Jharkhand

अबुबकर सिद्दीख पी, आप्र०से०

सचिव

Aboobacker Siddique P, I.A.S.  
Secretary



वन, पर्यावरण एवं जलवायु परिवर्तन विभाग  
झारखण्ड सरकार

Dept. of Forest, Environment &  
Climate Change, Government of Jharkhand

## Message



Climate Change is a systemic risk affecting every aspect of life – from economies, ecosystems, to livelihoods and society. Jharkhand stands as a case in point. This reality necessitates a shift towards environmental sustainability that prioritises resource optimisation not just for economic gain but for broader social goods.

This makes it imperative to balance environmental goals with socioeconomic realities, particularly for communities and vulnerable groups, throughout the planning process.

The Sustainable just Transition framework developed by the Task Force responds to this pressing need. It presents a blueprint for Jharkhand to adopt inclusive, equitable and climate-resilient development pathways that safeguard people, ecology and the economy.



(Aboobacker Siddique P.)

ए.के. रस्तोगी, भा.व.से. (सेवानिवृत्त)  
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A.K. Rastogi, IFS (retd.)  
Chairman



टास्क फोर्स-सस्टेनेबल जस्ट ट्रांजिशन  
झारखण्ड सरकार

Task Force, Sustainable Just Transition  
Government of Jharkhand

## Message



India has pledged to achieve net-zero emissions by 2070, backed by commitments under its updated Nationally Determined Contributions and Panchamrit goals. Jharkhand, a key contributor to India's energy security and industrial development, now stands at a critical crossroads.

A just transition approach—centred on equity, inclusion, and sustainability—is vital in such a context. Since there is no guiding framework or standard operating procedure in the country, the sustainable just transition framework for Jharkhand, presented here, has been developed through a series of participatory and bottom-up multi-stakeholder consultations and informed by the deep analysis of best practices and global case studies.

This is the first framework on sustainable just transition to outline a forward-looking pathway, and also presents a comprehensive definition to guide the transition process. It lays out a pathway commensurate with the context of Jharkhand to protect natural ecosystems, promote decarbonisation, clean energy-based ecosystems, and diversify the local economy innovatively and sustainably. It aims to enable the state to become future-ready by helping resource-rich yet vulnerable regions chart a resilient, low-carbon future, where no one is left behind.

  
A.K. Rastogi, IFS (retd.)

रमापति कुमार  
चीफ एजीक्यूटिव ऑफिसर

**Ramapati Kumar**  
Chief Executive Officer



सेंटर फॉर एनवायरनमेंट एंड  
एनजीई डेवलपमेंट (सीई)

Center for Environment and  
Energy Development (CEED)



## Message

Jharkhand has taken a historic step by developing a guiding framework for a Sustainable Just Transition in India. States play a critical role in translating national commitments into tangible, on-the-ground actions, though each faces unique challenges shaped by its resources, economy, and development priorities.

The visionary framework offers context-specific strategies and insights, enabling other resource-dependent regions to adapt and follow a similar transition path.

The Center for Environment and Energy Development (CEED) is proud to have supported the Task Force in shaping this initiative. The framework aims to foster convergence among actors, enablers and diverse stakeholders, building momentum towards an inclusive and future-ready economy.

**Ramapati Kumar**

### CENTER FOR ENVIRONMENT AND ENERGY DEVELOPMENT

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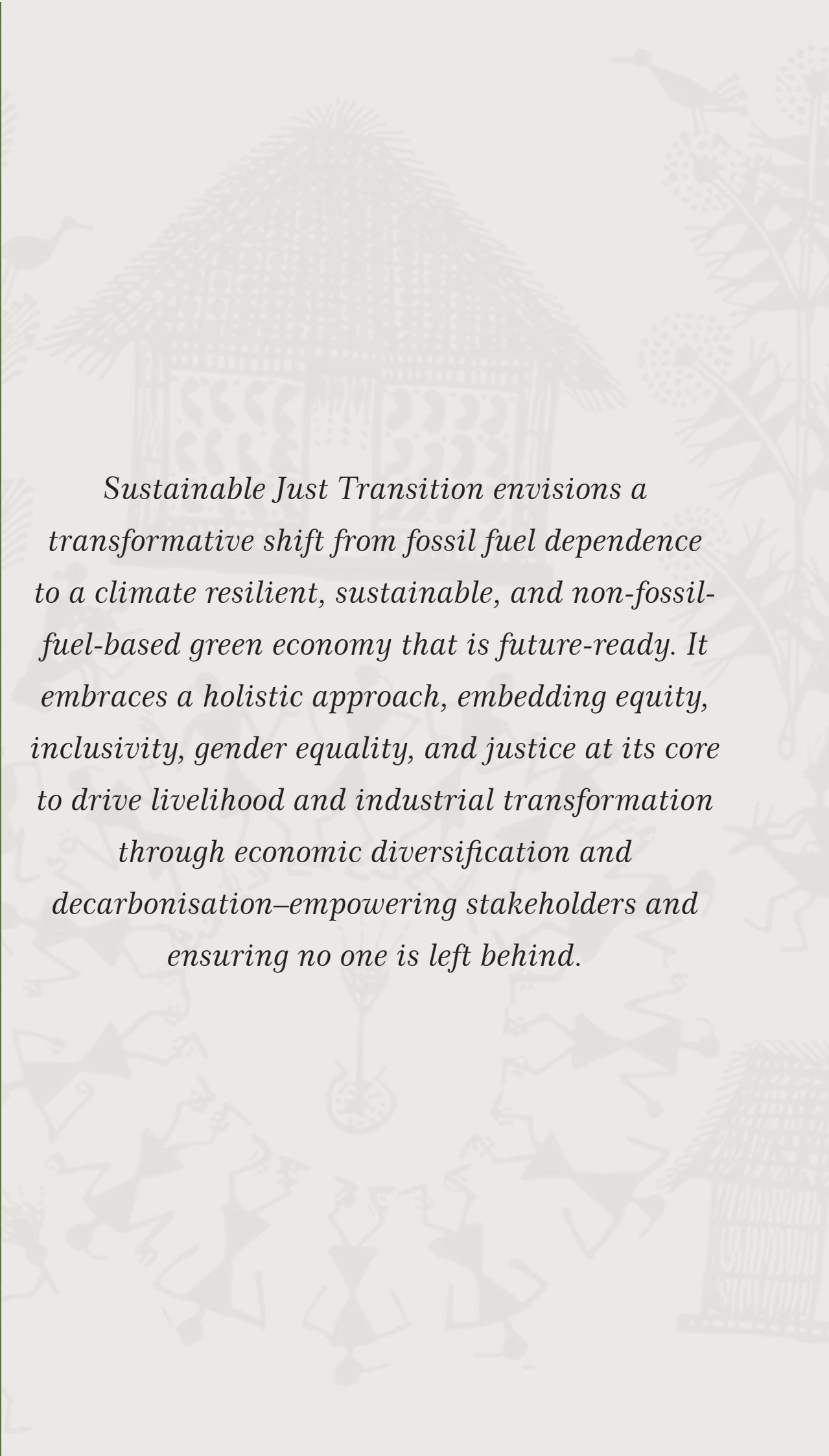
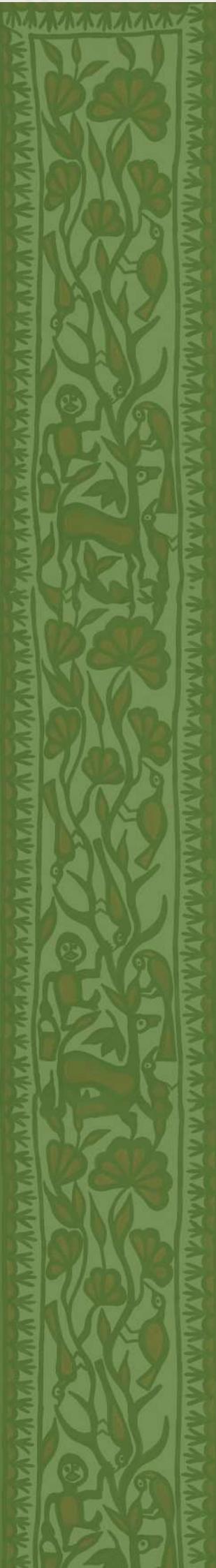
# Acknowledgement

The Framework of Sustainable Just Transition has been prepared through the active consultation with elected representatives and leaders, senior officials and designated members of the Task Force from key departments and agencies such as Forest, Environment and Climate Change; Finance; Planning and Development; Energy; Mines and Geology; Industries; Health, Family welfare and medical education; Agriculture, Animal Husbandry and Co-operative; Rural Development; Urban Development and Housing; Transport; Schedule Tribe, Schedule Caste, Minority and Backward Class Welfare; Labour, Employment, Training and Skill Development; Tourism, Arts, Culture, Sports and Youth Affairs; Jharkhand State Pollution Control Board; State Livelihood Promotion Society; Jharkhand Renewable Energy Development Agency; State Level Bankers Committee Jharkhand.

We also acknowledge the contributions made by the key stakeholders in the discussions and consultations, particularly leaders and key representatives of public sector undertakings, state-owned enterprises, leading corporate companies, industries, business and industry associations, MSMEs, trade unions, workers, think-tank, academic institutions, media, civil society, women groups, youths, tribal communities and people across the state.

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*Sustainable Just Transition envisions a transformative shift from fossil fuel dependence to a climate resilient, sustainable, and non-fossil-fuel-based green economy that is future-ready. It embraces a holistic approach, embedding equity, inclusivity, gender equality, and justice at its core to drive livelihood and industrial transformation through economic diversification and decarbonisation—empowering stakeholders and ensuring no one is left behind.*

# 01

## Introduction

As the world accelerates efforts toward climate action, the concept of just transition has gained prominence as a cornerstone of equitable climate policies. A just transition ensures that climate action is socially inclusive, economically viable, and regionally contextualised. Localised planning and robust frameworks are crucial to ensure that no community is left behind in this transition. Embedding justice and fairness in the transition process is especially vital for regions with deep economic ties to fossil fuels.

Climate change is exerting severe impacts on ecosystems, economies, and societies, disrupting lives and hindering development progress across the globe.<sup>1</sup> In response, countries are aligning development strategies with climate goals to limit global warming and build resilience.

India has committed to achieving net-zero emissions by 2070<sup>2</sup> as part of its updated Nationally Determined Contributions (NDCs). These include targets to install 500 GW of non-fossil fuel capacity and reduce emissions intensity by 45% from 2005 levels. Delivering on these national goals requires coordinated efforts across sectors and all levels of government.

States play a critical role in translating national commitments into tangible, on-the-ground actions. However, they face distinct opportunities and constraints shaped by their natural resources, economic structures, and development priorities. Western and southern states are well-positioned to scale up renewable energy, whereas eastern states such as Jharkhand, Odisha, and Chhattisgarh remain heavily reliant on coal which forms the backbone of state revenue, employment, energy security, and social infrastructure.<sup>3</sup>

Jharkhand, which has been instrumental in supporting the country's energy security and industrial growth, faces high vulnerability to climate risk. Its economic dependence on fossil-fuel powered ecosystems necessitate a strategic shift towards a resource-efficient, climate-resilient, and low-carbon economy.

The idea of "just transition" has emerged globally as a key framework to enable such a shift. It ensures that the move towards a climate-resilient future is equitable, inclusive, and leaves no one behind. A just transition framework focuses on promoting alternative livelihoods, economic diversification, and comprehensive social protection measures for affected communities.

For resource-rich regions such as Jharkhand, a conventional approach focusing solely on emissions reduction will be insufficient. A broader, people-centric strategy is essential—one that fully acknowledges and addresses the region's complex socio-economic realities.

In this context, this report presents the rationale for and outlines a framework towards a sustainable and inclusive just transition in Jharkhand. It aims to serve as a guiding document not only for Jharkhand but also for other resource-dependent states seeking to navigate a low-carbon, climate-resilient development pathway.

## Objectives:

To contextualise the just transition in the mineral resource-rich regions, aligned with their socio-economic, environmental, and development priorities.

To present a definition and comprehensive framework of Sustainable Just Transition commensurate with Jharkhand's unique challenges and opportunities.

# 02

## Evolution of Just Transition

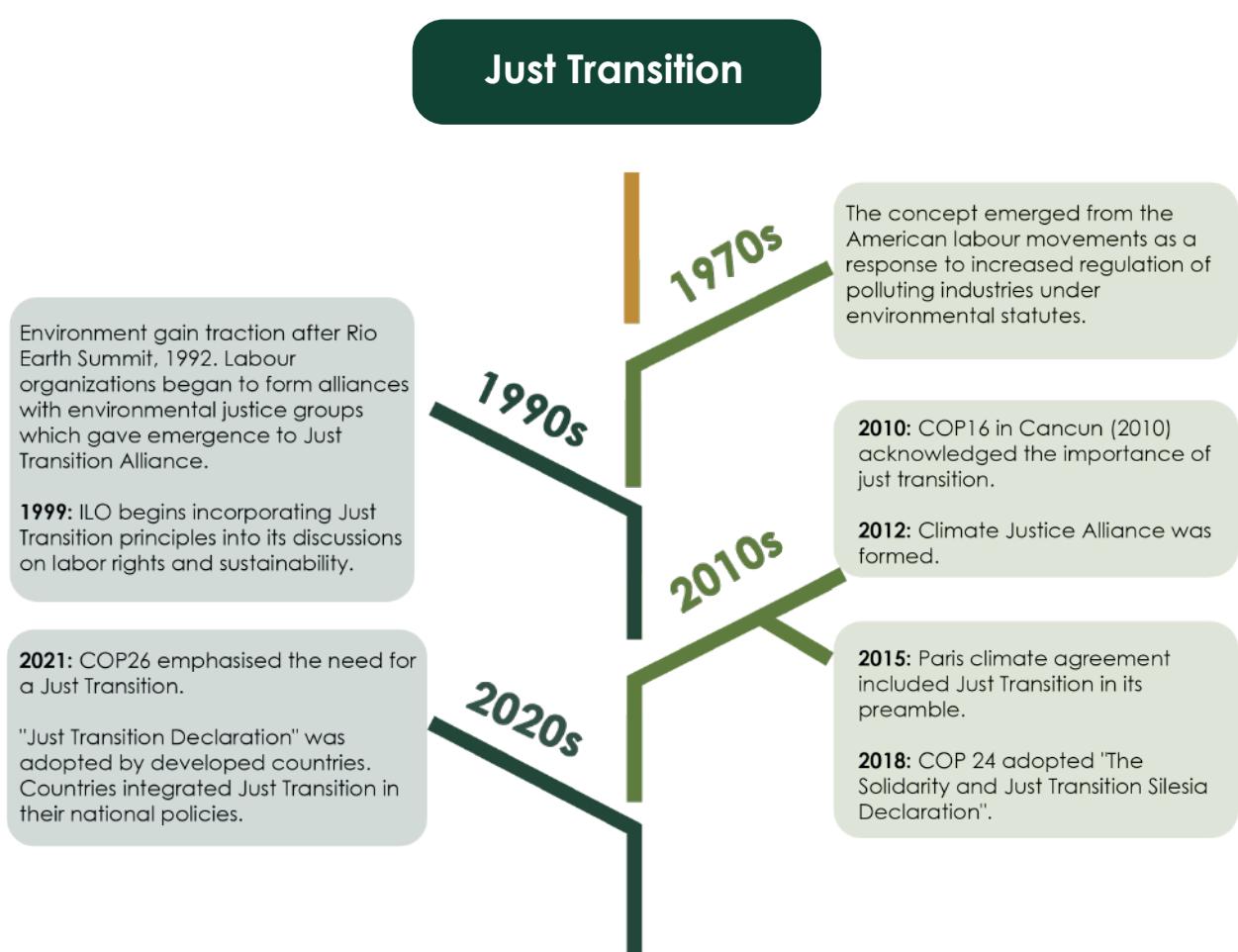
Just transition is a multidimensional, comprehensive and complex process that underpins ecological balance with holistic socio-economic development. It has evolved from the broader discourse on worker welfare, its alignment with the environment movement during the 1970-90s, and finding a prominent place in global climate negotiations and agreements led by UNFCCC in the recent decade. The contemporary emphasis lies in fostering inclusivity, ensuring that the entire spectrum of society-comprising all communities, workers, and social groups-actively participates in the transition towards climate resilience and a net-zero future.

## 2.1 Historical Journey

The concept of a just transition has evolved through successive movements advocating for workers' rights, environmental sustainability, and social justice. Initially rooted in trade union movements of the 1970s and 1980s, the idea gained traction as environmental concerns intensified, culminating in its inclusion in global climate negotiations.

International recognition was formally established when the Paris Agreement (2015)<sup>4</sup> incorporated the principle of a just transition into its preamble, underscoring the need to safeguard workers' rights and promote equitable economic restructuring. The Solidarity and Just Transition Silesia Declaration<sup>5</sup>, adopted during the 24th Conference of Parties (COP24) in Katowice (2018), further strengthened global commitments to integrating just transition principles into climate governance frameworks.

At COP26 in Glasgow (2021), countries reaffirmed their commitment through the Just Transition Declaration, emphasising the critical role of social dialogue, inclusive policymaking, and equitable distribution of transition benefits.



**Figure 1:** Milestones of Just Transition

## 2.2 Key Definitions of Just Transition

There are numerous interpretations of just transition (represented below), highlighting the complex interplay of contextual realities and differences, as well as the need for a nuanced, situation-specific assessment.

	<b>United Nation Organisations (UNO) <sup>6</sup></b> Ensuring that no one is left behind or pushed behind in the transition to low-carbon and environmentally sustainable economies and societies, can enable more ambitious climate action and provide an impetus to attaining the Sustainable Development Goals.
	<b>International Labour Organisation (ILO) <sup>7</sup></b> Just transition means greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind.
	<b>Organisation for Economic Cooperation and Development (OECD) <sup>8</sup></b> Just transition is about moving toward renewable, green industry in a just and fair way, looking after workers and preventing harm to communities from the transition process.
	<b>European Bank for Reconstruction and Development (EBRD) <sup>9</sup></b> A just transition seeks to ensure that the substantial benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically - be they countries, regions, industries, communities, workers or consumers.

Several countries and regions have also defined just transition based on their local contexts. In the US, various government agencies and institutions have described just transition in the policy documents. Colorado has officially defined Just Transition through the Colorado Office of Just Transition (OJT), established by the Just Transition from Coal-Based Electrical Energy Economy Act (2019).

A just transition means helping workers, businesses, and communities that have been dependent on coal-related industries as the state transitions to a clean energy economy. It ensures that those affected have access to new opportunities, support, and investment to create a sustainable future.<sup>10</sup>

South Africa has defined just transition and laid out the vision, principles, and interventions to give effect to the transition in an even and coordinated manner.

“A just transition aims to achieve a quality life for all South Africans, in the context of increasing the ability to adapt to the adverse impacts of climate, fostering climate resilience, and reaching net-zero greenhouse gas emissions by 2050, in line with best available science.

A just transition contributes to the goals of decent work for all, social inclusion, and the eradication of poverty.

A just transition puts people at the centre of decision making, especially those most impacted, the poor, women, people with disabilities, and the youth-empowering and equipping them for new opportunities of the future.

A just transition builds the resilience of the economy and people through affordable, decentralised, diversely owned renewable energy systems; conservation of natural resources; equitable access of water resources; an environment that is not harmful to one's health and well-being; and sustainable, equitable, inclusive land-use for all, especially for the most vulnerable.”<sup>11</sup>

## 2.3 Guiding Principles of Just Transition

Just Transition is more than an idea - it's a guiding principle, a systematic process, and a practical approach.<sup>12</sup> The principle of just transition encompasses that a strong economy and a clean, healthy environment can go hand in hand, the process should be fair and as a practice it should prioritise those who are most affected. Organisations have adopted different sets of principles aiming towards creating a Just transition. At COP-23 in Bonn, Germany, 2017, countries adopted ILO<sup>13</sup> principles serving as both a policy framework and a practical tool to guide them in managing the shift to low-carbon economies across all stages of development.

These principles also support countries to achieve their Intended Nationally Determined Contributions (INDC) and the 2030 Sustainable Development Goals. Additionally, the Inter governmental Panel on Climate Change (IPCC), in its 2022 Global Assessment Report, outlined 11 key elements of a Just Transition.<sup>14</sup>

By weaving Just Transition principles into the fabric of the Sustainable Development Goals (SDGs) , global community reinforces the interconnectedness of social, economic, and environmental goals, emphasising the need for holistic and inclusive strategies to navigate the complexities of our shared future.

Just Transition adopts a comprehensive approach to justice, encompassing, Recognitional, Distributive, Procedural and Restorative Justice. These justice pillars underpin the necessity to extend climate ambitions beyond technological adjustments, emphasising the fair allocation of costs and benefits in ambitious climate actions.



**Figure 2:** Guiding Principles of Just Transition across the World

# 03

## Just Transition in the Global and National Context

Across the world, various countries have undertaken several initiatives on developing policy and regulatory mechanisms to shape the pace of transition by setting up commissions, task forces and committees. Many developed countries have witnessed the several phases of planning and implementation by financing the economic restructuring, workforce adjustment and adopting green measures. Whereas developing countries have just started the journey and they are still developing guidelines and governance structure to further shape the transition pathways. In India, the discourse on just transition is gradually evolving, with focus on integrating social and economic considerations into climate goals.

## 3.1 Just Transition Around the World: Case Studies and Learnings

Developed countries have been pioneering in implementing structured and well funded frameworks. They focus on shifting away from fossil fuels while ensuring economic stability and environmental sustainability.

### European Countries

EU<sup>15</sup>



The EU's Just Transition Mechanism is the key part of the European Union's Green Deal that aims to address the social and economic effects of the transition, focusing on the regions, industries and workers who will face the greatest challenges.

Germany<sup>16</sup>



Germany's 'Commission on Growth, Structural Change and Employment' was established in 2018 as a multi-stakeholder coalition to negotiate and mitigate the impacts of a coal phase-out. The commission developed a plan to end coal-fired power generation by 2038 and provide targeted support for coal-dependent regions and coal industry workers.

UK<sup>17</sup>



The UK's just transition efforts have been largely fragmented, lacking a comprehensive framework. The transition away from coal in the 1980s and 1990s was abrupt, with minimal government support for affected workers and communities. More recent policies focus on sectoral decarbonisation, but the absence of a coordinated strategy has led to inconsistent implementation across regions. Insufficient financial support, limited reskilling programs, and weak stakeholder engagement. Local communities have also been largely excluded from decision-making processes, further weakening the transition's effectiveness.

Spain<sup>18</sup>



Spain's Just Transition Strategy (2019) with an Urgent Action Plan provides a framework for mine closures, exceptional cost aid, and regional revitalisation. Spain announced the closure of coal mines by December 31, 2020, redirecting subsidies to restructure mining regions. The work is spearheaded by the Just Transition Institute through Just Transition Agreements with impacted regions.

Poland<sup>19</sup>



Poland's just transition efforts are primarily shaped by the EU's Just Transition Fund, aimed at supporting coal-dependent regions in their shift away from fossil fuels. The government has established 'Regional Just Transition Plans' focusing on reskilling coal workers, economic diversification, and infrastructure development. However, the transition remains largely centered on formal coal workers rather than addressing broader societal impacts.

## Scotland<sup>20</sup>



Scotland's Just Transition Commission offers advice on achieving a net-zero economy by 2045, emphasising fairness and inclusivity. The commission promotes participatory governance, ensuring workers and communities play a central role in the transition process.

## North America

USA<sup>21</sup>



The United States has focused on revitalising coal-dependent workers through programs like the 'Coal Communities Commitment'. This initiative directs federal resources to affected regions for economic diversification, workforce retraining, and infrastructure development, helping workers transition to green jobs.

Canada<sup>22</sup>



Canada's Task Force on Just Transition provides recommendations for phasing out coal by 2030, focusing on worker retraining, financial support, and fostering alternative industries in coal-dependent regions.

Developing countries often rely on international cooperation and financing to implement equitable energy transitions. Just Energy Transition Partnership (JETP) in South Africa and Indonesia, have showcased the potential of collaborative efforts. These partnerships showcase equitable, finance-driven pathways for low-carbon transitions in emerging economies and emphasise the need for context-specific solutions and capacity building to ensure sustainable outcomes.

## Developing Countries from Asia/Africa/South America

## South Africa<sup>23</sup>



South Africa's just transition is shaped by its heavy reliance on coal for energy and employment. The Presidential Climate Commission (PCC) was established in December 2020 to guide a fair and inclusive transition, focusing on worker reskilling, social protection, and regional economic diversification. However, implementation remains slow due to financial constraints, political resistance, and the dominance of state-owned utility Eskom. While formal coal workers receive some support, informal workers and broader communities face significant uncertainty, with limited stakeholder engagement beyond industry actors.

## Indonesia<sup>24</sup>



Indonesia's just transition is primarily driven by its participation in the Just Energy Transition Partnership (JETP), which aims to phase out coal while developing renewable energy alternatives. However, policies remain focused on managing coal industry impacts, particularly for formal workers, with less emphasis on broader social protections or alternative livelihoods for affected communities. Limited local participation and financial dependency on international funding create challenges in ensuring a truly equitable transition.

## Vietnam<sup>25</sup>



Vietnam's just transition efforts are aligned with its commitment to phase out coal and develop renewable energy under the Just Energy Transition Partnership (JETP). The government has introduced policies for energy sector reforms, but support remains largely centered on formal coal workers and state-owned enterprises, with insufficient provisions for small businesses, informal workers, and affected local communities. Implementation is further complicated by regulatory barriers and financial constraints.

## Argentina<sup>26</sup>

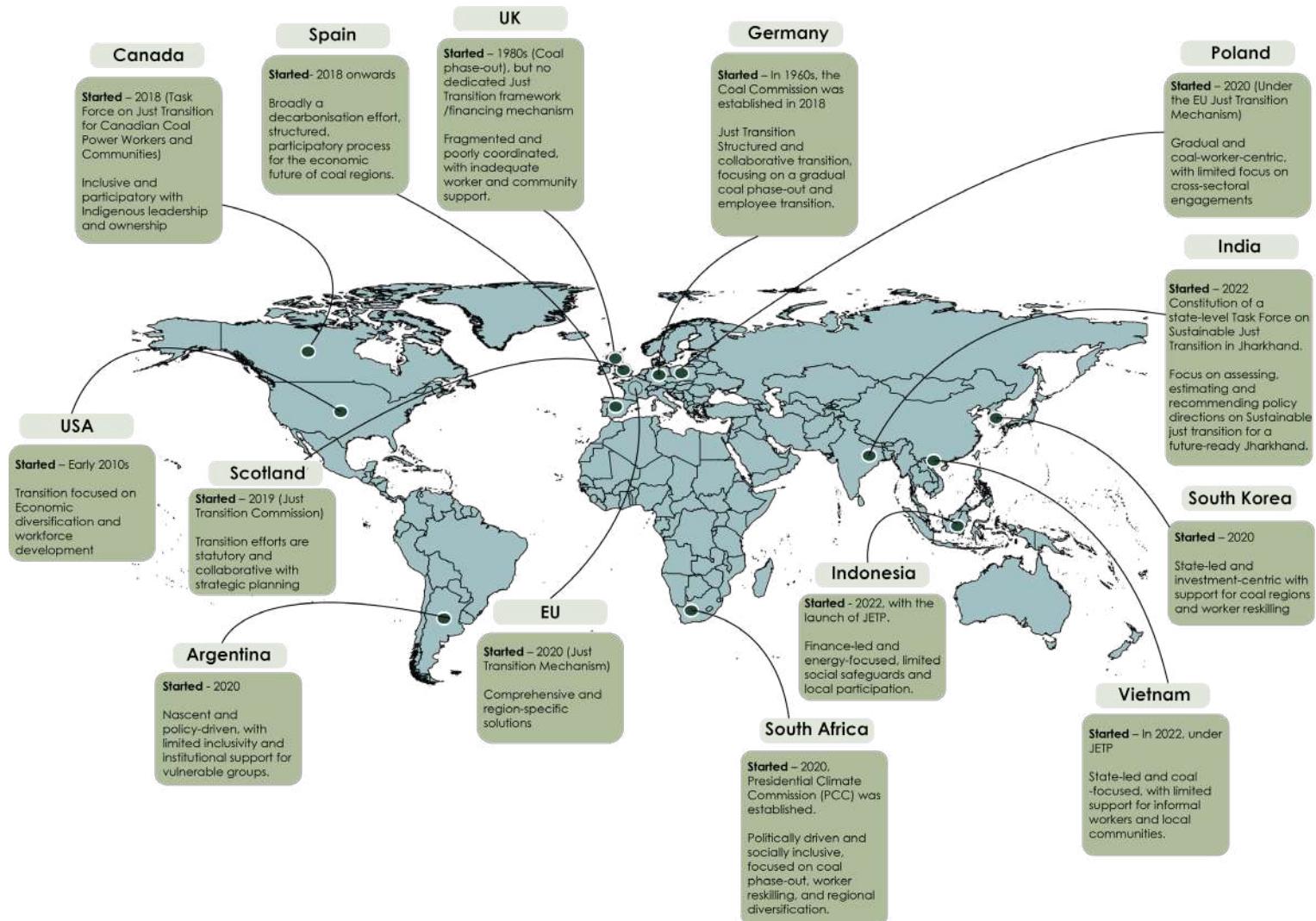


Argentina's just transition approach is still in its early stages, shaped by broader climate policies rather than a dedicated national framework. The transition away from fossil fuels is slow, with a primary focus on the formal workforce in energy-intensive industries. Economic challenges, reliance on fossil fuel revenues, and political instability have hindered the development of inclusive policies. As a result, affected communities and informal workers receive little institutional support, and there is limited stakeholder engagement in shaping the transition process.

## South Korea<sup>27</sup>

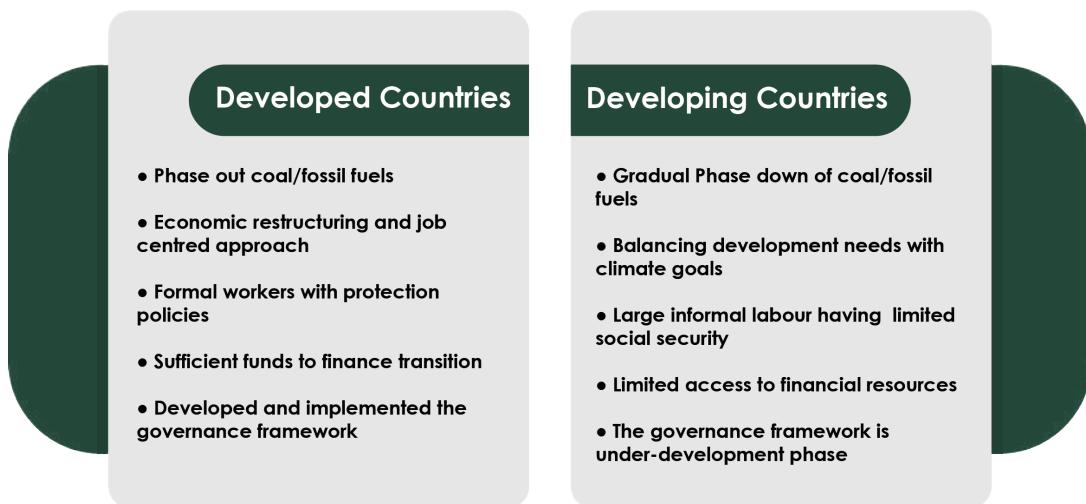


In 2020, South Korea pledged to achieve carbon neutrality by 2050, aligning with its Green New Deal and 2050 Carbon Neutral Strategy. The plan includes phasing out coal, expanding renewable energy, improving energy efficiency, and investing in carbon capture technologies. In 2022, South Korea engaged in discussions for a Just Energy Transition Partnership (JET-P) with international partners.



**Figure 3: Global Landscape of Just Transition: Evolution and Approaches across Countries**

## Different Focus on Just Transition in Developed and Developing Countries



## Key Insights from Initiatives around the world

**One-Size-Fits-All' does not work:** Every transition is unique. Localisation and context-specific approaches are key to uncovering common challenges and opportunities.

**Multi-Stakeholder Engagement:** Engaging governments, industry, businesses, workers, civil society and affected communities ensures a balanced and inclusive transition.

**Social Dialogue:** Open discussions between policymakers, industry, trade unions, and affected communities help build trust and consensus.

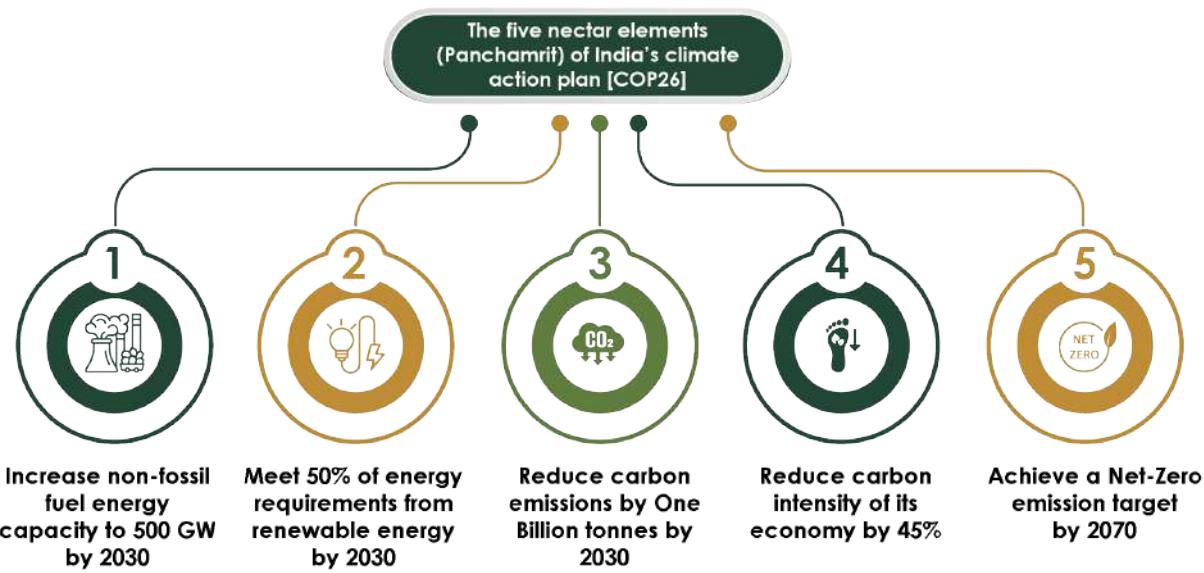
**Inclusive Approach:** Align just transition efforts with social inclusion strategies, economic stability, and localised climate plans.

**Finance as a Catalyst:** Leverage both international, multilaterals and domestic funding to sustain transition efforts effectively.

**Strong Governance:** Effective leadership by the government is crucial for coordination and sectoral capacity-building to prevent fragmentation and ensure accountability.

## 3.2 Policies and Initiatives in India

India is actively pursuing low-emission growth pathways and making significant efforts to implement climate actions in its socio-economic sphere. India announced its Panchamrit goals, and updated its NDC towards more ambitious climate goals, attaining net-zero carbon emissions by 2070. India has also announced Mission LiFE for adopting Lifestyle for Environment and low carbon future.



India has taken several sector-specific initiatives to address Just Transition, primarily through different ministries focusing on coal, energy, steel, and climate action. The Ministry of Coal's S&JT Division<sup>28</sup> oversees mitigation efforts, while coal mine closure guidelines focus on environmental rehabilitation<sup>29</sup>. An inter-ministerial policy brief aims to create economic opportunities for coal-dependent communities. State-level steering committees<sup>30</sup> are driving energy transition goals, and India has emphasised climate justice in global forums<sup>31</sup>. Meanwhile, state owned enterprises and Public Sector Undertakings (PSUs) as well private companies and corporates are setting net-zero targets and advancing climate mitigation.

### **Ministry of Coal**

The Ministry of Coal established Sustainability & Just Transition (S&JT) Division consisting of the Sustainable Development Cell (SDC) & Just Transition (JT) Section.

### **Parliamentary Consultative Committee**

Creation of Parliamentary Consultative Committee on Emerging Issue of Coal Mine Closure and Achieving Just Transition for All.

### **Ministry of Power and New & Renewable Energy**

The Ministry has requested states and UTs for setting up a state level steering committees under chief secretary to achieve state-specific Energy Transition Goals and drive Sustainable Growth.

### **Ministry of Steel**

The Ministry of Steel has constituted 13 Task Forces with the engagement of industry, academia, think tanks, S&T bodies, different Ministries and other stakeholders to discuss, deliberate and recommend upon decarbonisation of the steel sector. The Task Force<sup>32</sup> on Skill Development is constituted to carry out discussions on skilling, up-skilling and re-skilling of the workforce towards production of green steel, thereby ensuring the just transition of the steel sector.

### **Ministry of Environment Forest and Climate Change**

Inter-Departmental Committee/Task Force on JT, Headed by Secretary of MoEFCC (February 2024).

### **Niti Aayog**

Niti Aayog has constituted a body/committee to map out a just transition framework (2024)<sup>33</sup>. This initiative is made up of nine different inter-ministerial working groups, consisting of relevant ministries and other stakeholders.

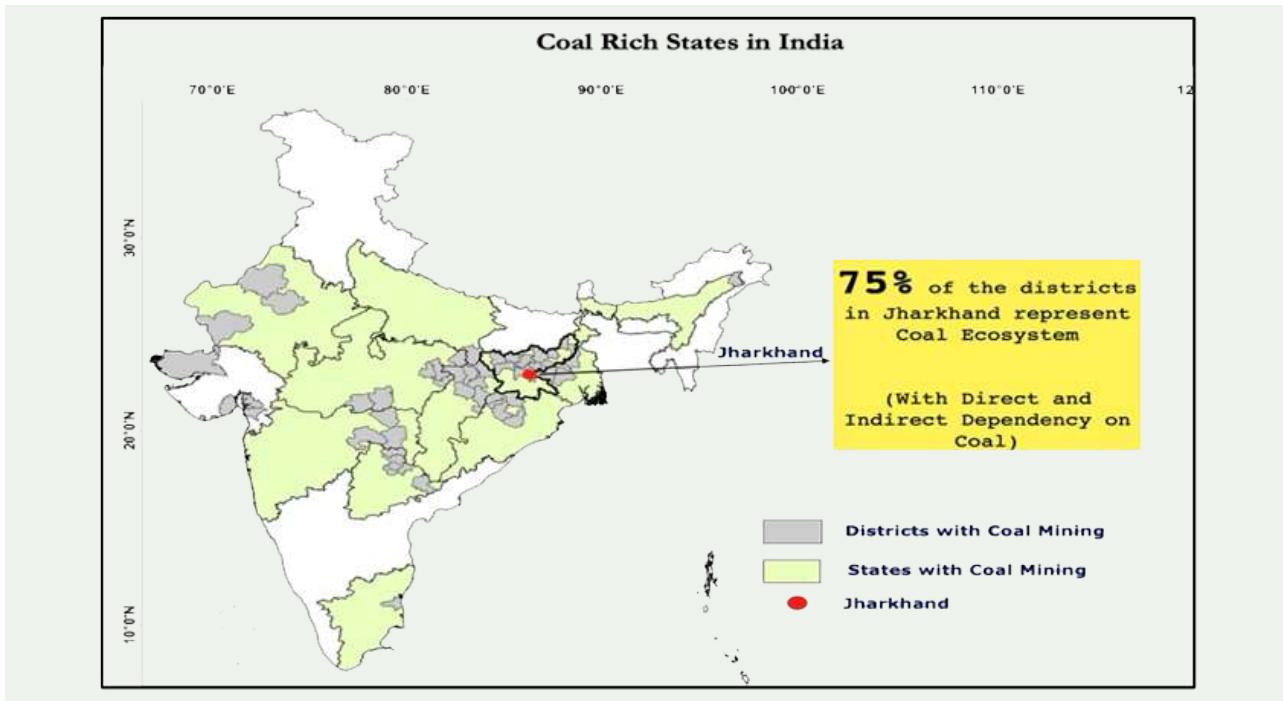
# 04

## Imperative of Just Transition in Jharkhand

The resource rich states like Jharkhand, face unique challenges in balancing economic progress with environmental sustainability. With abundant natural resources and industrial base, Jharkhand anticipates a rise in energy consumption, attaining socio-economic progress necessitating innovative mechanisms for meeting climate and development goals. By integrating climate goals, the state can move towards an inclusive, resilient economy that balances environmental conservation with human development.

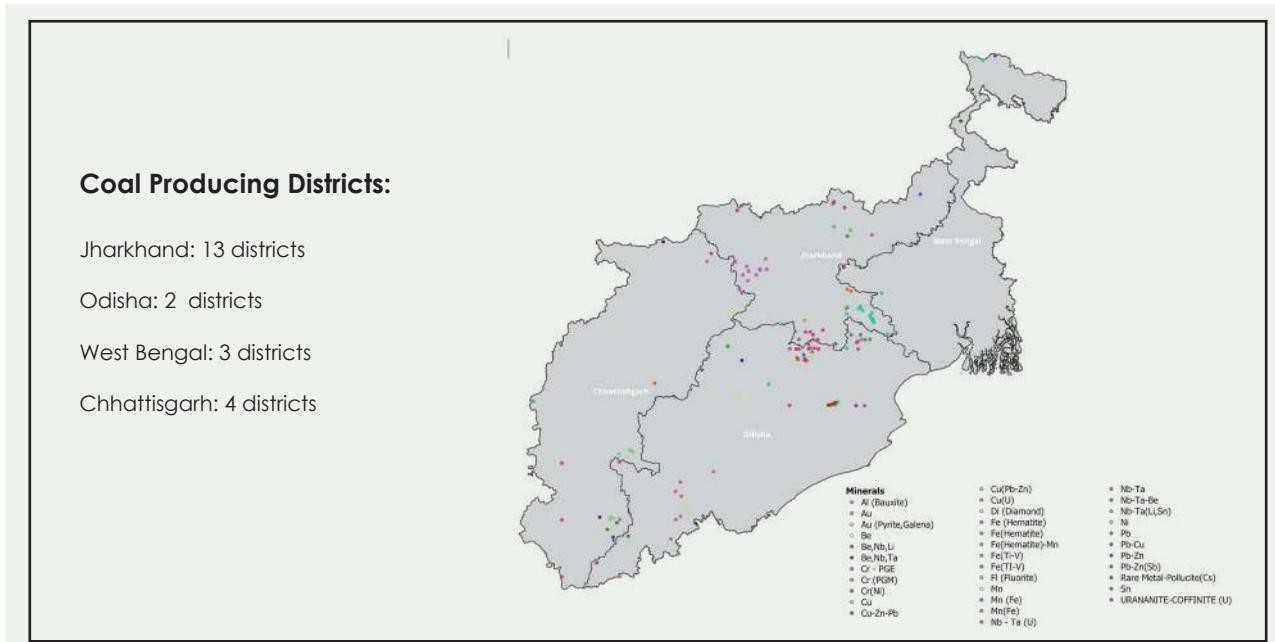
## 4.1 Fossil Fuel Dependence

Jharkhand's dependence on fossil fuels is high. Among the eastern coal-producing states, it has the highest number of coal-rich districts—13 out of 24. The local economies of districts such as Ranchi, Ramgarh, Bokaro, Dhanbad, Giridih, Hazaribagh, Chatra, Deoghar, Dumka, Godda, Pakur, Latehar, and Medininagar (Palamu) largely revolve around coal and allied activities.



**Figure 4:** Coal Rich States in India

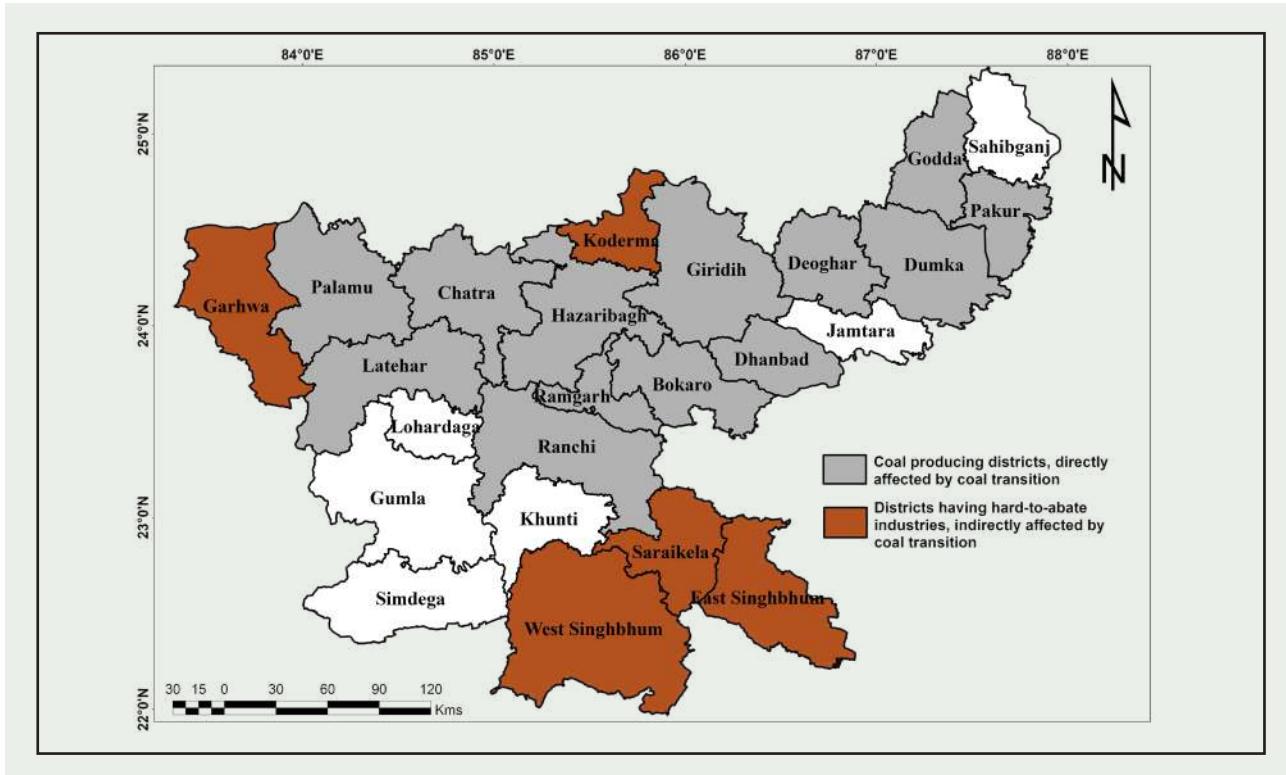
Source: CEED Analysis



**Figure 5:** Coal producing districts in Eastern/Central India

Source: CEED Analysis

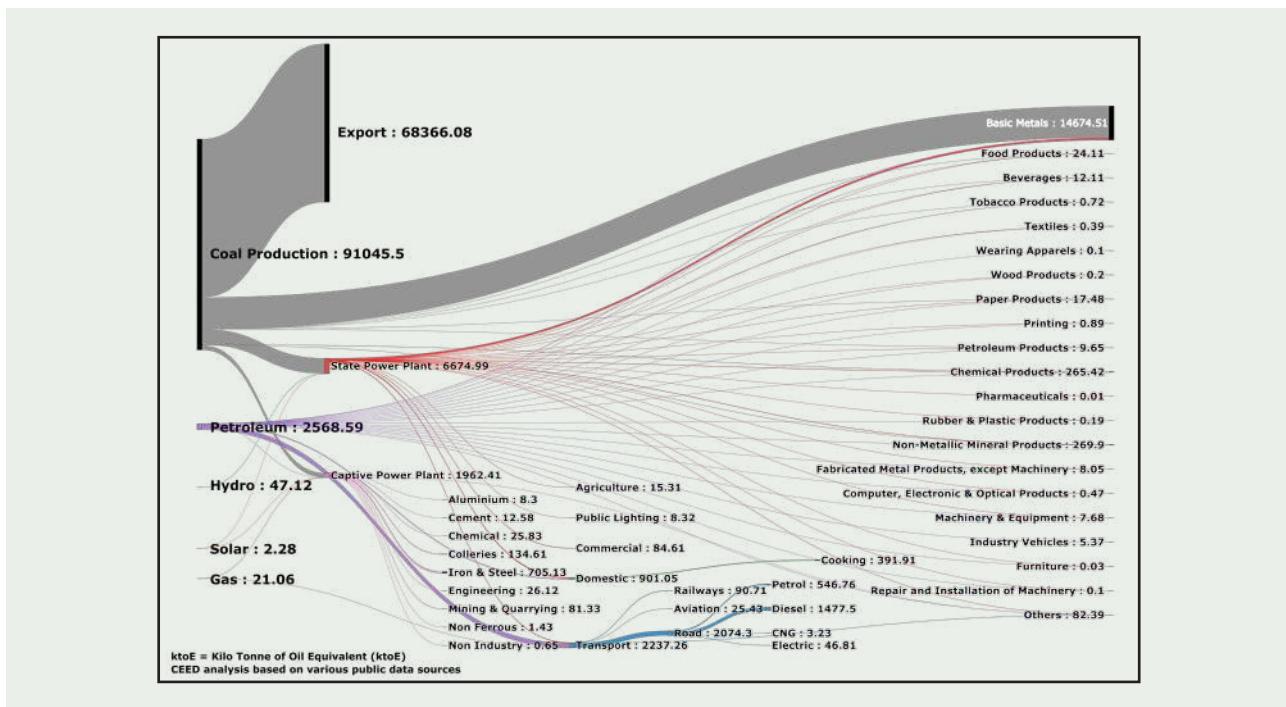
In addition to these, five districts—East Singhbhum, Seraikela-Kharsawan, West Singhbhum, Koderma, and Garhwa—host 'hard to abate' industries such as steel, cement, chemicals, fertilisers, and automobiles.



**Figure 6:** Coal Rich and hard to abate industries based districts in Jharkhand  
**Source:** CEED Analysis

Jharkhand's coal economy extends beyond fiscal and industrial contributions, deeply embedding itself in the socio-economic fabric of the state. It provides direct and indirect employment.

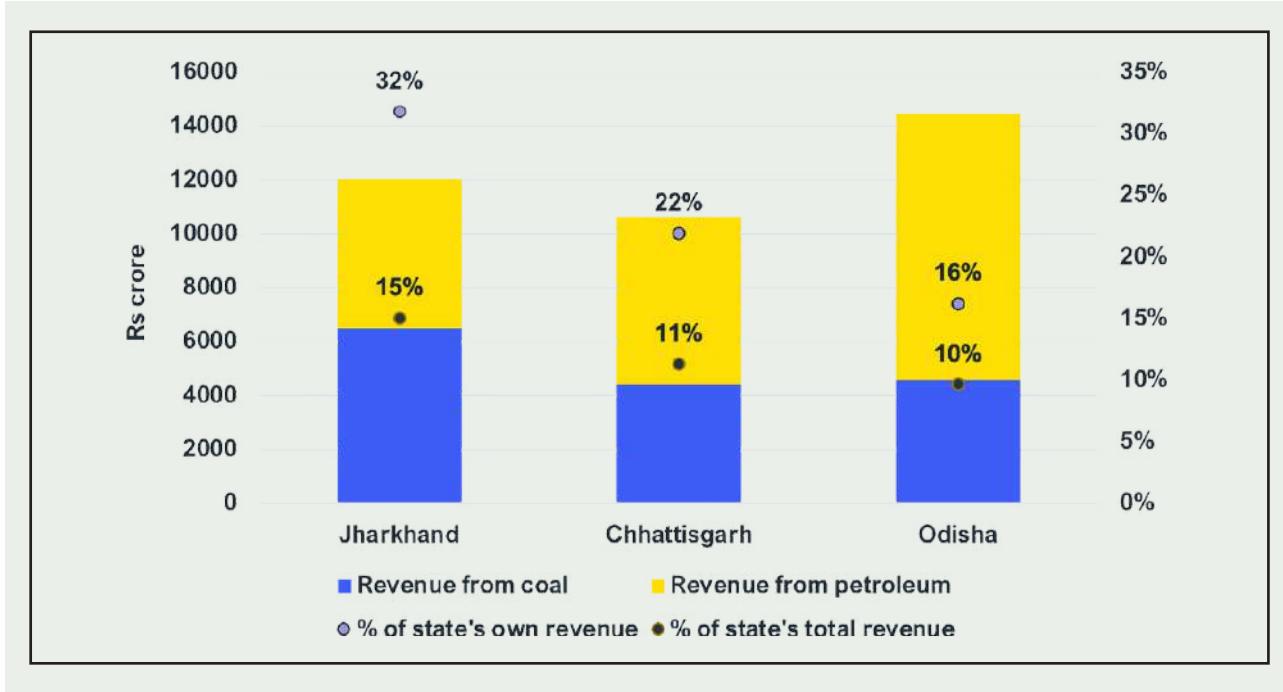
Jharkhand's economic landscape is intricately linked to fossil fuels as it holds 40 per cent of India's mineral reserves. It contributes around 27 percent to India's total coal production. Coal also contributes to 90% of the energy needs of the state.



**Figure 7:** Energy Flow for Jharkhand [in ktoE]  
**Source:** CEED Analysis

## 4.2 Reliance on Fossil Fuels for State Revenue

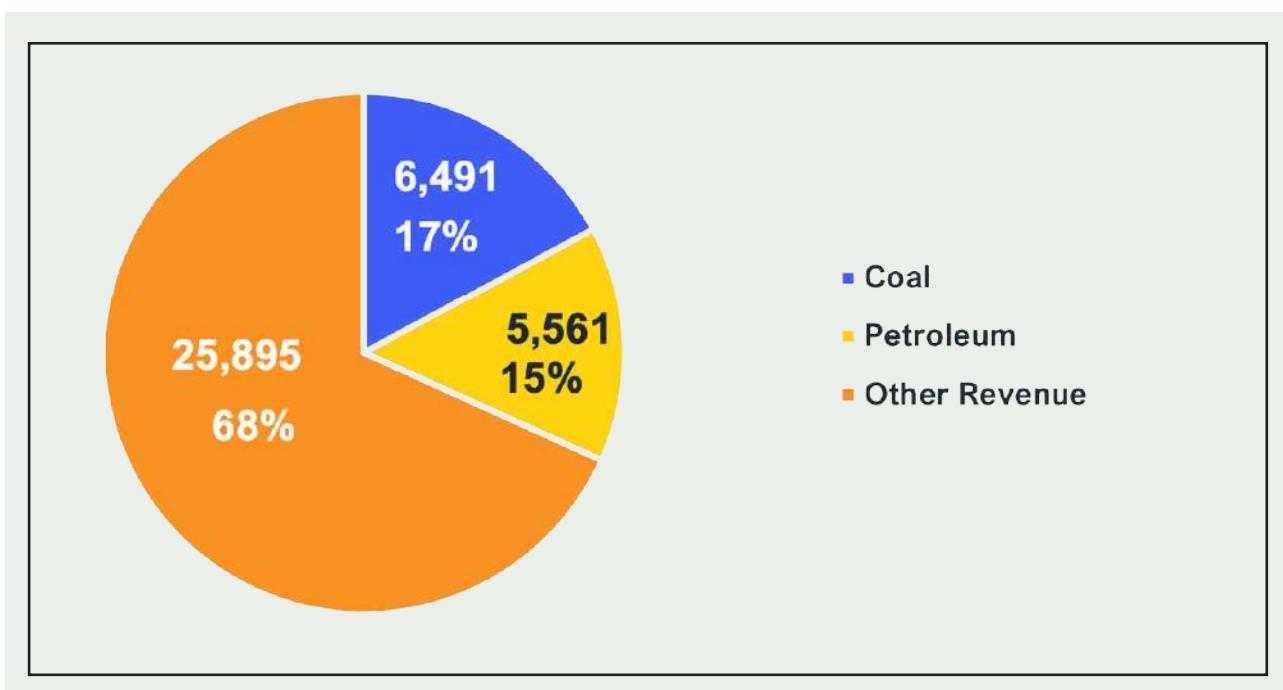
Jharkhand is the highly dependent on fossil fuels, which account for 32% of its revenue. In comparison, Chhattisgarh shows a lower dependency at 22%, while Odisha has significantly reduced its reliance on fossil fuels, with only 16% of its revenue coming from these sources.<sup>34</sup>



**Figure 8:** Fossil Fuel Dependency (FY 2021-22)

Source: IEEFA

Jharkhand's economy relies heavily on revenue generated from fossil fuel resources. Coal and petroleum contribute 17% and 15% to Jharkhand's Own Revenue. Approximately 57% of Jharkhand's GST collection comes from fossil fuel-dependent sources.



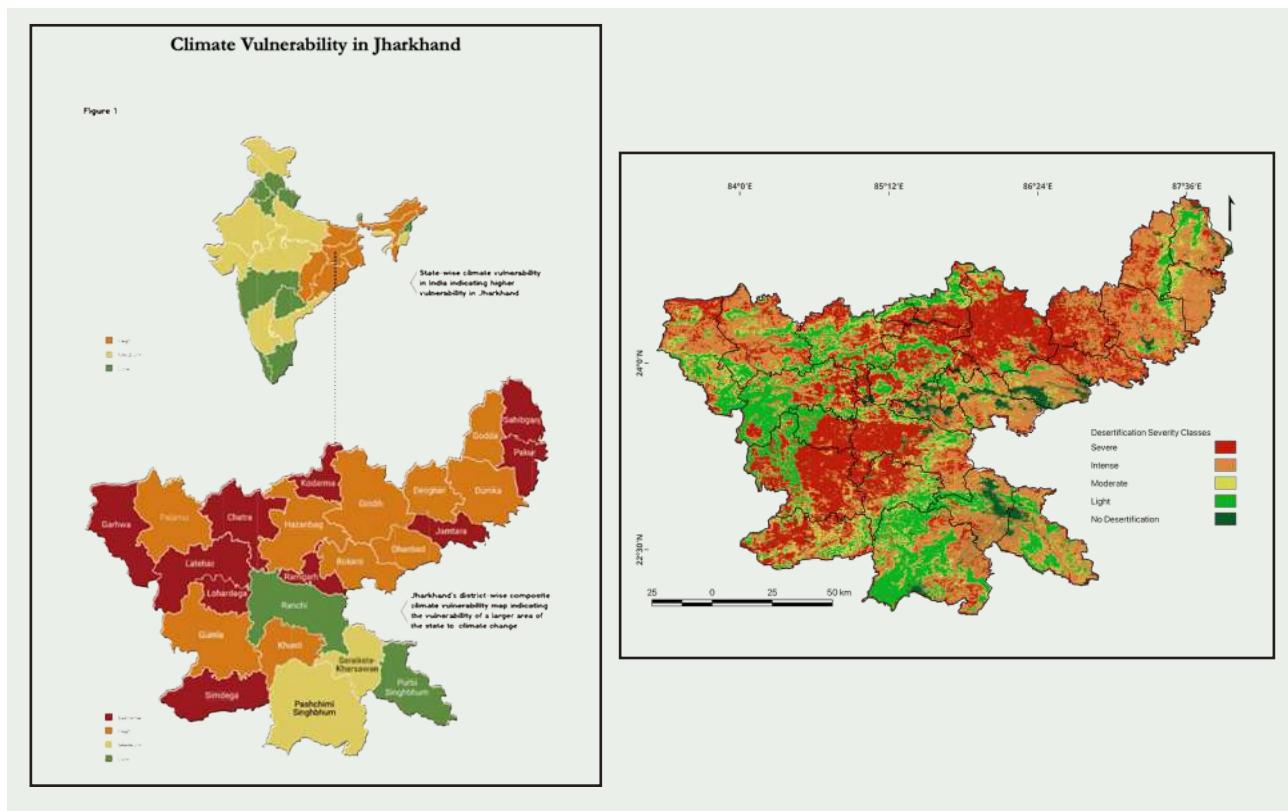
**Figure 9:** Jharkhand's Direct Fossil Fuel Revenue Dependency (FY2022-23) (in Rs Crore)

Source: IEEFA

## 4.3 Environmental Stress and Climate Vulnerabilities

Jharkhand has the highest vulnerability index of 0.674. Approximately 60% of districts, including Sahibganj, Pakur, Chatra, Garhwa, Palamu, Giridih, Hazaribagh, Bokaro, Khunti, and Godda, are classified as highly vulnerable.

Jharkhand has 68.98% of its geographical area under desertification, placing it among the top five Indian states with the highest desertification levels (Desertification Atlas 2016). Districts such as Giridih (73.79%), Bokaro (67.25%) and West Singhbhum (46.49%) have alarmingly high levels of land degradation.<sup>35</sup>



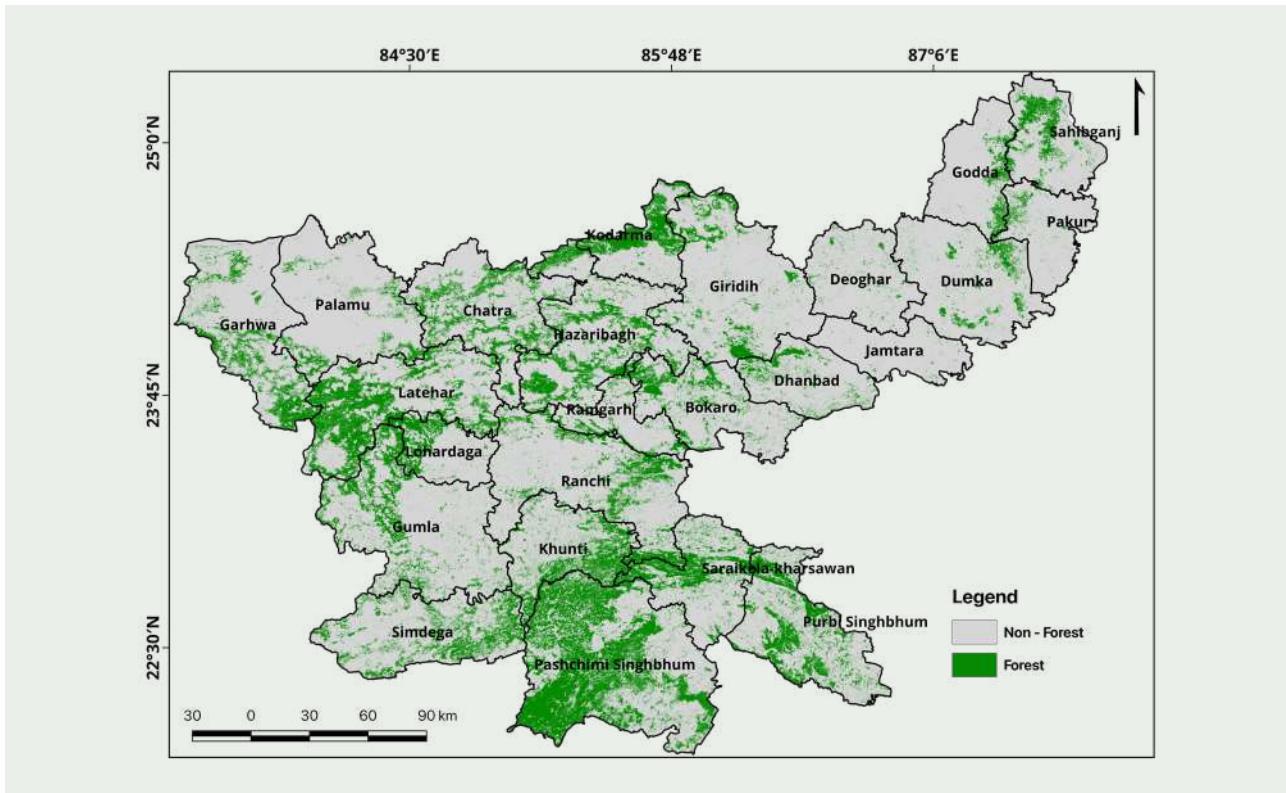
**Figure 10:** Climate Vulnerability and Desertification Status in Jharkhand

## 4.4 Developmental Challenges

Jharkhand comes within the bottom three performing states as per the SDG India Index 2023-24 of Niti Aayog. Jharkhand's performance has been unsatisfactorily on SDG 2 (Zero Hunger), SDG 5 (Gender Equality) and SDG 13 (Climate Action)<sup>36</sup>. As per the 'National Multidimensional Poverty Index Baseline Report 2023,' 29% of Jharkhand's population live in poverty<sup>37</sup>.

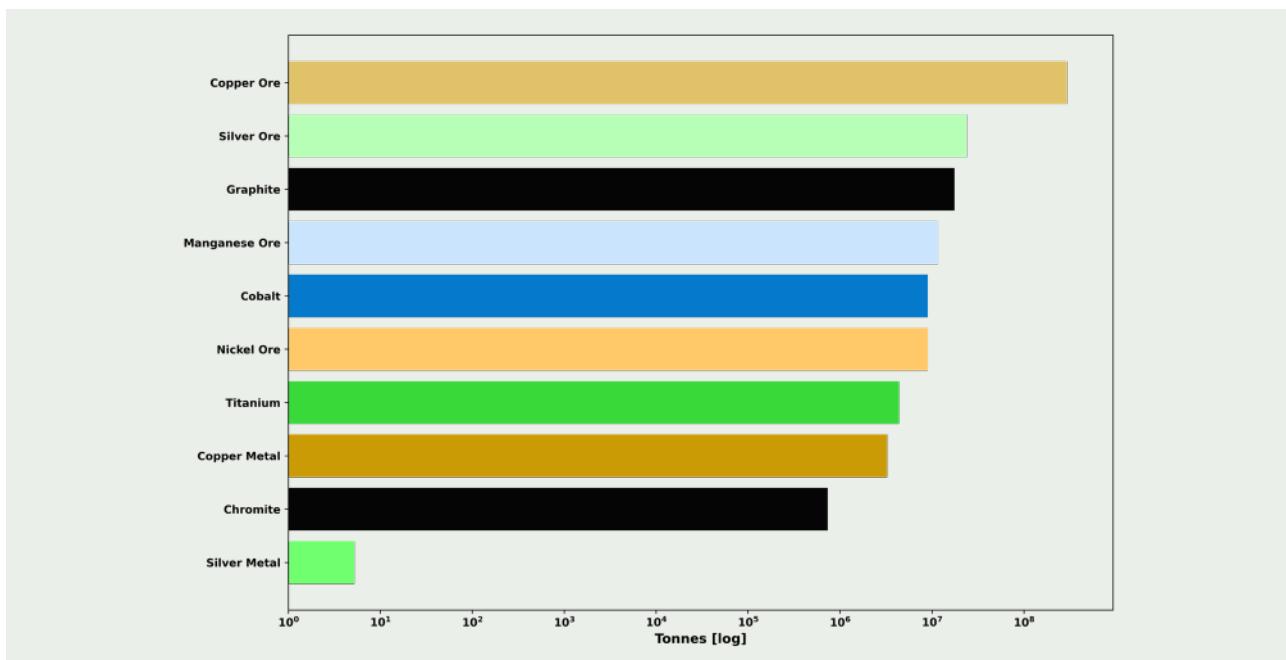
## 4.5 Abundant Resources as an Opportunity

Jharkhand has 31.51% of the state's geographical area as recorded forest area (RFA)<sup>38</sup> while the forest cover is 29.81%<sup>39</sup>. The state's forests are home to various valuable timber and non-timber forest products, contributing to livelihoods and biodiversity conservation.



**Figure 11:** Status of Forest Cover in Jharkhand

Jharkhand is ranked 2nd in iron ore, 3rd in copper ore, and 7th in bauxite reserves. It also has reserves of 12 critical minerals (copper, nickel, graphite, silicon, cobalt, lithium, cadmium, titanium, gallium, selenium)<sup>40</sup> essential for industrial development.



**Figure 12:** Critical Mineral Resources in Jharkhand  
**Source:** Indian Minerals yearbook 2021

# 05

## Sustainable Just Transition in Jharkhand

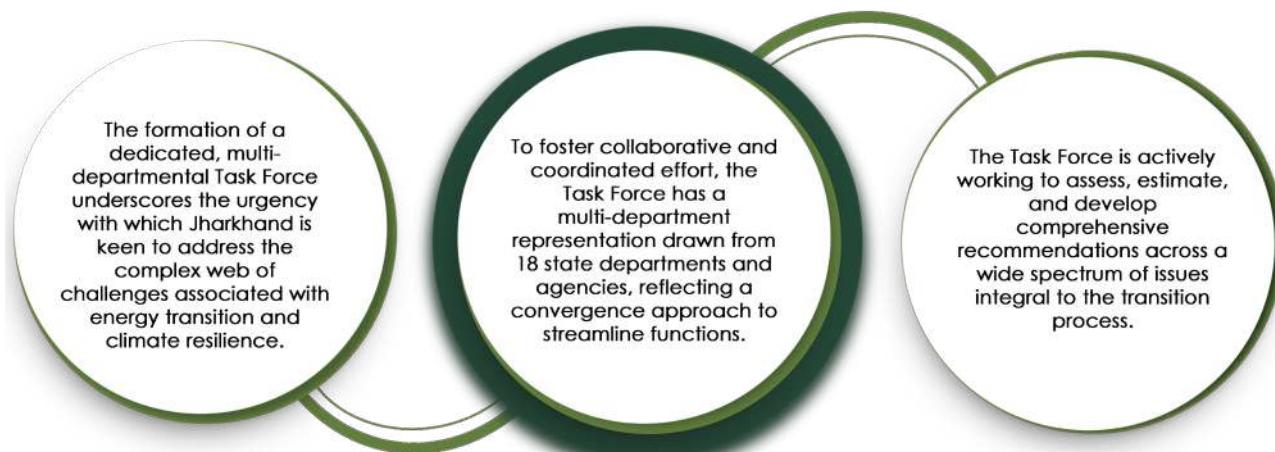
India's national climate commitments and development aspirations increasingly highlight the importance of a just transition. However, there is no formal mandate from the Government of India—along with the lack of standardized guidelines or a commonly accepted definition—which poses challenges for operationalizing just transition at the state level. While global frameworks provide useful reference points, India's vast socio-economic and ecological diversity requires tailored, context-specific approaches. In this regard, Jharkhand's initiative to advance a sustainable just transition stands out as both pioneering and forward-looking.

Shifting towards a net-zero and climate-resilient development approach is a challenging task for Jharkhand. Recognising the challenges and the unique context of the state, the Government of Jharkhand took several initiatives during May to November 2022. A series of consultations and workshops that created a multi-stakeholder dialogue forum fostering inclusive dialogue and collaborative solution-building.

## 5.1 Constitution of the Task Force in Jharkhand

The Government of Jharkhand established a Task Force on Sustainable Just Transition (notification letter, no 3204, dated 04.11.2022; Dept. of Forest, Environment & Climate Change) to act upon the challenges and align with national climate goals.

This dedicated multi-departmental Task Force is taking steps to address the complex web of challenges associated with energy transition and climate resilience.



## 5.2 Guiding Principles of Sustainable Just Transition in Jharkhand

Sustainable just transition is a multidimensional and comprehensive process, it has been guided by a strong vision rooted in equity, inclusivity, and a people-centric approach, with a particular focus on gender-responsive strategies.

It aims to create a transformative shift where environmental sustainability and socio-economic well-being are harmonised, ensuring that climate actions are just and inclusive. Emphasising a phased and structured approach aligning with India's climate ambitions, the Net-Zero target, Mission LiFE, and SDGs.



**People-centric Approach:** A just transition must be driven by the needs, aspirations, and rights of the people, ensuring their voices are at the core of policymaking and implementation. This means engaging with local communities, workers, and grassroots leaders to co-develop solutions that promote livelihoods, protect cultural heritage, and enhance social well-being.



**Equity:** A truly just transition must prioritise equal opportunities ensuring no one is left behind. By fostering inclusivity, it can create a resilient economy that balances growth with social justice, setting the course for equitable transitions.



**Justice:** A just transition upholds fairness in the distribution of both benefits and burdens, ensuring that vulnerable communities, workers, and marginalised groups are not disproportionately affected. This means protecting workers' rights, and ensuring that climate policies do not exacerbate existing inequalities but rather create opportunities for all.



**Gender:** A gender-responsive just transition recognises the disproportionate impact of climate change on women and other genders and ensures their active participation in decision-making processes. By integrating gender equity and empowering women as leaders in the transition, it fosters more inclusive and resilient communities.



**Inclusivity:** A truly just transition must be inclusive, ensuring that all communities benefit from the shift to a sustainable economy. This means prioritising the participation of tribal communities, informal workers, and women in decision-making and economic opportunities.



**Sustainability:** A sustainability-based approach is a prerequisite for shaping a Just Transition in Jharkhand. It risks economic stagnation and environmental degradation, and deepening social inequalities. A proactive shift towards sustainability will not only secure the economic future but also serve as a model for equitable energy transitions in resource-rich regions.



**Figure13:** Sustainable Just Transition Principles in Jharkhand and their components

## 5.3 Thematic Areas Identified by the Task Force

In order to create an enabling framework for sustainable transition, the Task Force identified eight thematic areas as critical and important components to support the transition process in the state.



**Figure 14:** Thematic areas of Sustainable Just Transition in Jharkhand

# 06

## Framework for Sustainable Just Transition

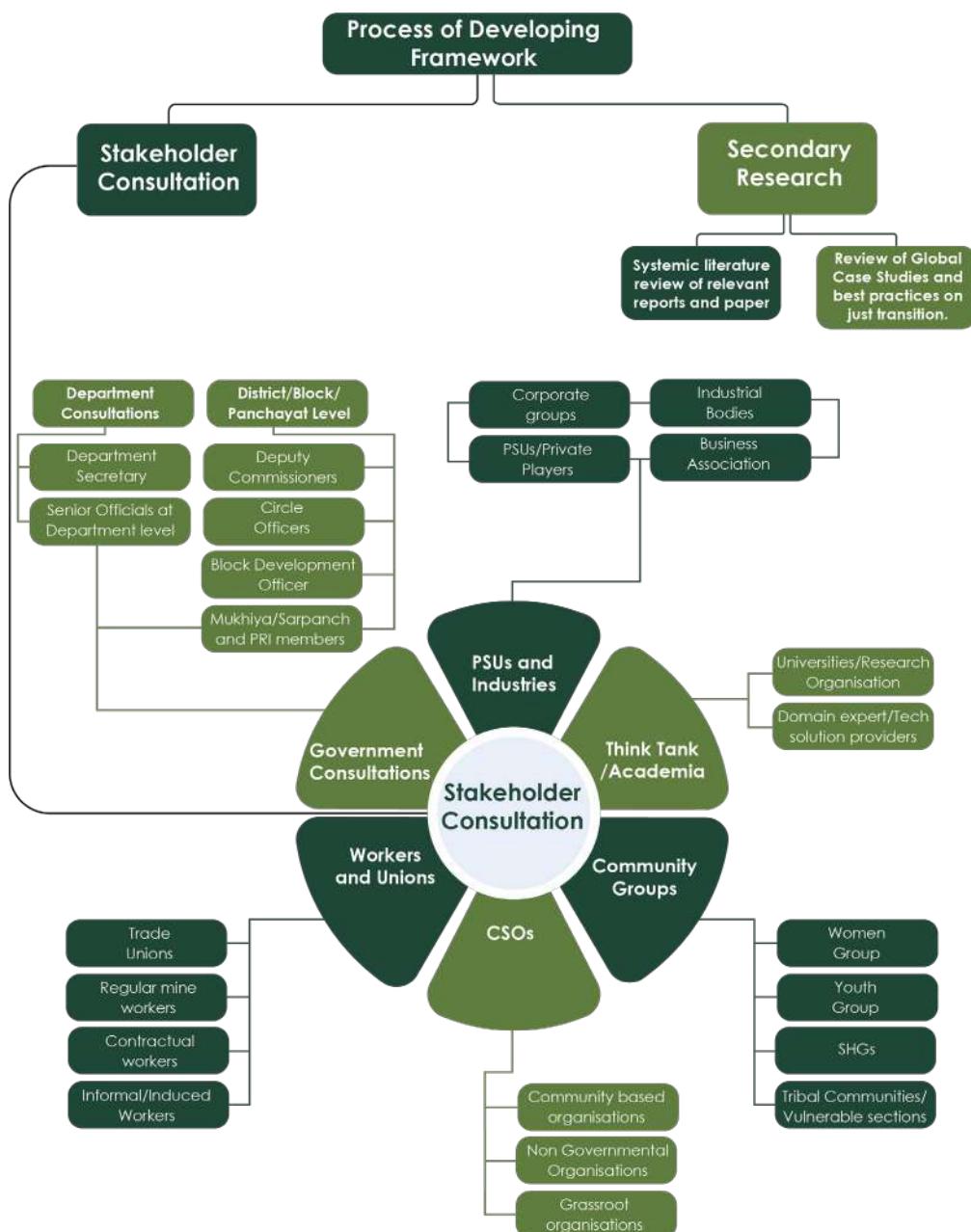
A framework is critical for shaping well-structured and inclusive policies that can navigate the complexities of a just transition. A definition and a comprehensive framework for a just transition can ensure that actions are coherent, equitable, and aligned with long-term development goals. The framework aims to foster a shared understanding among governments, industries, workers, and communities, enabling them to address region-specific challenges while unlocking opportunities for sustainable growth, inclusive development, and climate resilience.

# 6.1 Method and Process of Developing Framework

The methodology for developing the framework and defining Sustainable Just Transition involved research and wide-ranging consultations with key stakeholders.

A series of discussions were held through a state-level conference, departmental consultations, and district/block/Panchayat-level meetings, engaging diverse stakeholders; government officials, industries, business associations, think-tanks, academics, trade unions, workers, civil society organisations, women, youth, tribal people and local communities.

These participatory and bottom-up consultations and meetings ensured that local voices were heard and aligned with development priorities. By bringing together diverse perspectives, concerns and aspirations, the process aimed to create a fair and inclusive transition plan for the state.



**Figure 15:** Process of developing Framework for Sustainable Just Transition in Jharkhand

## 6.2 Definition of Sustainable Just Transition

Defining Sustainable Just Transition for Jharkhand helps establish a shared understanding of its goals, ensuring that common principles guide policies and actions. This definition can also serve as a valuable reference for shaping just transition pathways in other resource-rich regions aspiring for forward looking transformations.

**Sustainable Just Transition envisions a transformative shift from fossil fuel dependence to a climate-resilient, sustainable, and non-fossil-fuel-based green economy that is future-ready. It embraces a holistic approach, embedding equity, inclusivity, gender equality, and justice at its core to drive livelihood and industrial transformation through economic diversification and decarbonization—empowering stakeholders and ensuring no one is left behind.**



**Figure16:** Multifaceted Thematic Areas of Sustainable Just Transition in Jharkhand

## 6.3 Key Drivers of Sustainable Just Transition

### A. Economic Diversification

Economic diversification involves expanding local economic opportunities by strengthening existing activities and developing new, locally appropriate alternatives. It aims to enhance livelihoods, reduce dependence on limited sectors, and foster resilient local economies in line with sustainable just transition objectives. It can be achieved by reducing economic losses and transforming fossil-based value chains through altering upstream and downstream operations. Appropriate land and resource use planning ensures these transformations support long-term sustainability and equitable development.

Jharkhand can enable economic diversification by identifying high-potential sectors rooted in its natural and human resource base—such as renewable energy deployment, agro-processing, forest produce, art-crafts, and eco-tourism—while also exploring opportunities in emerging service-based industries. Strengthening local value chains, improving infrastructure and market access, and promoting MSMEs and community enterprises are pre-requisite to generating sustainable livelihoods.

#### Assessment and Scoping



- ⦿ **Socio-economic profiling**  
Households, livelihood patterns, and migration trends  
  
Assessing the local context and understanding vulnerabilities, especially in coal-dependent regions.
- ⦿ **Stakeholder mapping**  
Communities, workers, industries/businesses, cooperatives, and local government bodies to identify institutional gaps, capacity, and opportunities.
- ⦿ **Impact assessment**  
Focus on regions and sectors that are highly vulnerable—particularly regions and hotspots with strong dependence on the fossil fuel ecosystems.
- ⦿ **Barrier and opportunity analysis**  
Infrastructure deficits, skill gaps, financial access, digital connectivity, and availability of support mechanisms critical for economic transition.
- ⦿ **Identification of emerging and competitive sector**  
Market trend, resource-based profiling (natural and human) with growth potential



#### Planning & Development

- ⦿ **Roadmap Development**  
At district, block, and panchayat levels to enable diversification and reduce overdependence on a single sector
- ⦿ **Sector Prioritisation**  
High-potential livelihood generating areas, particularly agro-processing, renewable energy, MSMEs, eco-tourism, art-crafts, and service-based industries.
- ⦿ **Infrastructure and Ecosystem Development**  
Improve and scale up physical infrastructure to support MSME growth and economic clusters.

## B. Renewable Energy Ecosystem

Renewable energy ecosystem refers to the interconnected network of technologies, industries, and institutions that support the development, deployment, and maintenance of clean energy sources that are sustainable—such as solar, wind, hydro, and bioenergy. The ecosystem includes manufacturing of energy systems, training and employment of workers, creation of supportive infrastructure, financing mechanisms, and regulatory frameworks. This transition not only decarbonises the economy but also unlocks new economic opportunities, job creation, and technological advancements, making it a pillar of sustainable development.

### Assessment and Scoping



#### ● **Renewable Energy Resource Mapping**

Estimation of Solar/wind/biomass/small hydro/pump-hydro energy storage potential at state/district /block level through satellite data, LULC, elevation, etc.

#### ● **Energy System Modelling**

Analysis of energy demand and supply scenarios power generation mix optimisation, and grid integration needs through various decarbonisation pathways.

#### ● **Institutional and Infrastructure Assessment**

Existing gaps and issues in power generation and transmission related to DISCOMs and utilities.

#### ● **Regional RE Transition Plans**

To harness local resource availability, labour potential, and infrastructure readiness, ensuring that clean energy deployment and energy efficiency measures align with development goals.

#### ● **MSME and Local Manufacturing Support**

Industrial policy planning that includes targeted incentives, credit access, and technology transfer schemes to enable MSMEs participate in the renewable energy value chain.

#### ● **Grid Modernisation and Storage Integration**

Enhance grid flexibility and reliability in high RE-penetration zones (e.g., pumped hydro energy storage system,).

#### ● **Skill Development and Job Substitution Programs**

Training and certification schemes (e.g., under Suryamitra or Skill India program) for upskilling workers in installation, O&M, manufacturing, and project development.



### Planning & Development

## C. Decarbonisation

Decarbonisation focuses on a shift from carbon-intensive practices and fossil fuel dependence toward cleaner, low-carbon, and sustainable alternatives. It adopts a phased and sector-specific approach, combining technology upgrades, and energy efficiency and infrastructure measures to reduce emissions effectively.

Jharkhand, with its mix of large and small-scale industries—including hard-to-abate sectors heavily reliant on fossil fuels—requires a targeted approach. The industrial decarbonisation strategy, therefore, involves identifying existing gaps and challenges, reviewing and strengthening regulatory policies, and prioritising infrastructure investments to enable long-term, sustainable transformation across sectors.

### Assessment and Scoping



- **Baseline Emission Assessment and Hotspot mapping**  
Comprehensive GHG emissions inventory using internationally recognized methodologies Map energy flows and carbon hotspots within industrial processes.
- **Industry and MSME Cluster Assessment**  
Energy usage, emission levels, and technology gaps in major industrial hubs and MSME clusters.
- **Scoping of Novel Technologies and Cleaner Energies**  
Green hydrogen, carbon capture, utilisation and storage (CCUS) in industry & MSME sector; and electric vehicles, energy efficiency, changing fuel-mix in transport sector.
- **Institutional Landscape Review**  
Identify gaps, overlaps, and opportunities for better alignment with climate goals.



### Planning & Development

- **Sector-Specific Decarbonisation Roadmaps**  
To avoid, capture and substitute carbon emissions from various sectors.
- **Industrial and MSME decarbonisation**  
through energy-efficient technologies, harnessing carbon capture solutions, and ensuring compliance with Environment, Social, Governance (ESG) standards.
- **Transport decarbonisation**  
through electric vehicles and encouraging alternative fuels such as biofuels and green hydrogen to reduce emissions from long haul trucking. Decarbonising Agriculture practices, enhancing carbon sequestration projects, and sustainable land and water management practices.
- **Supporting Industries and MSMEs through PPP**  
Pilot projects for green hydrogen production and CCUS in key sectors for scalability Green industrial clusters through land use planning, subsidized clean energy access, and shared infrastructure for renewable energy generation and clean tech to drive economies of scale and innovation.
- **Regulatory Support**  
Regulatory frameworks and performance-based incentives such as carbon credits, green certification schemes, and tax benefits to promote investment in low-carbon technologies.

## D. Land Repurposing

Land is a vital resource for any kind of economic activities to support just transition work. Land Repurposing is the process of converting underutilised, closed/mined-out land—particularly in coal-dependent regions—into ecologically restored and economically productive spaces. It involves adhering to sustainable mine closure practices that prioritise environmental rehabilitation and socio-economic revitalisation.

Jharkhand has vast tracts of land that can be repurposed for developing new economic opportunities e.g. supporting renewable energy infrastructure, agriculture and allied activities, eco-tourism, thereby rejuvenating the local economy and generating new livelihood opportunities for the affected people/local communities.

### Assessment and Scoping



#### ④ Land and Asset Identification

Mapping and estimation of decommissioned or underutilized land parcels, Land Use and Land Cover (LULC) analysis

#### ④ Regulatory Compliance

Adherence to Sustainable Mine Closure guidelines (as per the norms of Ministry of Coal/Indian Bureau of Mines/Coal Controller of India), and relevant state and national laws

#### ④ Classification of Potential Land Use

For ecological restoration, industrial growth and green ecosystem

#### ④ Cost of Land Use/repurposing

To assess and estimate economic feasibility, environmental restoration requirements, and infrastructure investment needs.



### Planning & Development

#### ④ Repurposing and Spatial Planning

Comprehensive land utilisation plan, that can cater to local development aspirations

#### Integration with Economic Diversification Strategies

Linking land repurposing with emerging and need based sectors such as clean energy, agro-processing, nature-based livelihoods, and service-oriented industries, MSME parks, green entrepreneurship zones to generate local employment.

#### ④ Decentralised and Localised Planning

Coordination among various departments and agencies—mining, environment, rural development, and industry—to enable integrated decision-making and efficient use of funds at the local level.

## E. Human Resource and Skill Development

Human resource and skill development refers to the process of equipping workers and communities with the education, training, and skills needed to participate in and benefit from a green and sustainable economy. As economies move towards transitions, there is a growing demand for new skill sets in emerging sectors and economic opportunities. It ensures that workers—especially those displaced from traditional sectors receive the support needed to adapt, upskill, or reskill for emerging opportunities.

### Assessment and Scoping



- **Vulnerability Profiling**  
Affected populations, particularly informal workers, women, youth, and migrants for targeted skilling and livelihood support.
- **Stakeholder Engagement**  
Industries, training institutions, community organisations, and government departments.
- **Skill Mapping and Labour Market Assessment**  
Skill gap analysis across existing and emerging sectors (e.g., renewable energy, agro-industries, eco-tourism) to identify training needs and employment trends.
- **Education and Training Infrastructure Mapping**  
Availability and quality of Industrial Training Institutes (ITIs), Rural Skill Centres, and other training facilities at the district/block level.



### Planning & Development

- **Skilling, Up-skilling and Reskilling Programs**  
Design need-based, demand-driven training curricula, aligned with local livelihood needs and opportunities .
- **Integration with Local Economic Strategies**  
Align skilling programs with regional economic diversification to ensure job-market linkage and practical utility.
- **Community-Based Training Models**  
Decentralised models through Self-Help Groups (SHGs), cooperatives, and village resource centres to increase participation and ownership.
- **Digital and Green Skill Promotion**  
Digital literacy, green job skills to prepare workers for future-ready employment.
- **Partnerships with Training institutes**  
Existing training institutes and industry-led training partnerships to scale up training infrastructure and delivery.

## F. Sustainable Financing

Sustainable finance focuses not only on environmental goals but also on advancing key social priorities by promoting decent employment, livelihood opportunities, and skill development, while empowering communities—especially the most vulnerable—to actively participate in and benefit from the transition process.<sup>41</sup>

As a critical pillar of a sustainable just transition, financing ensures that workers, communities, and industries have the necessary resources to adapt and thrive. Jharkhand needs a multi-pronged strategy: implementing green budgeting to optimise existing public funds, mobilising diverse capital sources (e.g., blended finance, bonds, Just Transition Fund), and building institutional capacity to manage and scale sustainable investment.

### Assessment and Scoping



#### ○ **Gap and Needs Assessment**

Funding requirements for diversification, skilling, infrastructure, RE development, and social protection in affected areas.

#### ○ **Financial Landscape Mapping**

Existing funding sources - state budget, District Mineral Foundation Trust (DMFT), Corporate Social Responsibility (CSR), and multilateral sources.

#### ○ **Stakeholder Identification**

Government bodies, DFIs, philanthropies, banks, and private investors relevant to green and just transition financing.

#### ○ **Policy and Regulatory Review**

Existing state/national frameworks for enabling green finance, impact investing, blended finance models, and credit access for MSMEs and cooperatives.

#### ○ **Blended Finance Models**

Models that combine public subsidies, CSR contributions, and private equity to reduce risk and attract capital for just transition projects.

#### ○ **DMFT and CSR Mainstreaming**

DMFT and CSR funds for infrastructure, training, renewable energy, and enterprise development in affected districts.

#### ○ **Dedicated Just Transition Fund**

State-level fund to support vulnerable regions and communities.

#### ○ **De-risking and Guarantee Mechanisms**

De-risking instruments such as partial credit guarantees, interest subvention schemes and viability gap funding to support green MSMEs.

#### ○ **Project Preparation and Pipeline Development**

Bankable pipeline of just transition projects (in RE, skill centres, community enterprises, agro-clusters) for potential investors and government funding schemes.

#### ○ **Green Budgeting**

State planning and budgeting processes; include transition-specific components in line departments' budget allocations for climate resilience and sustainable development.



### Planning & Development

## 6.4 Governance Framework

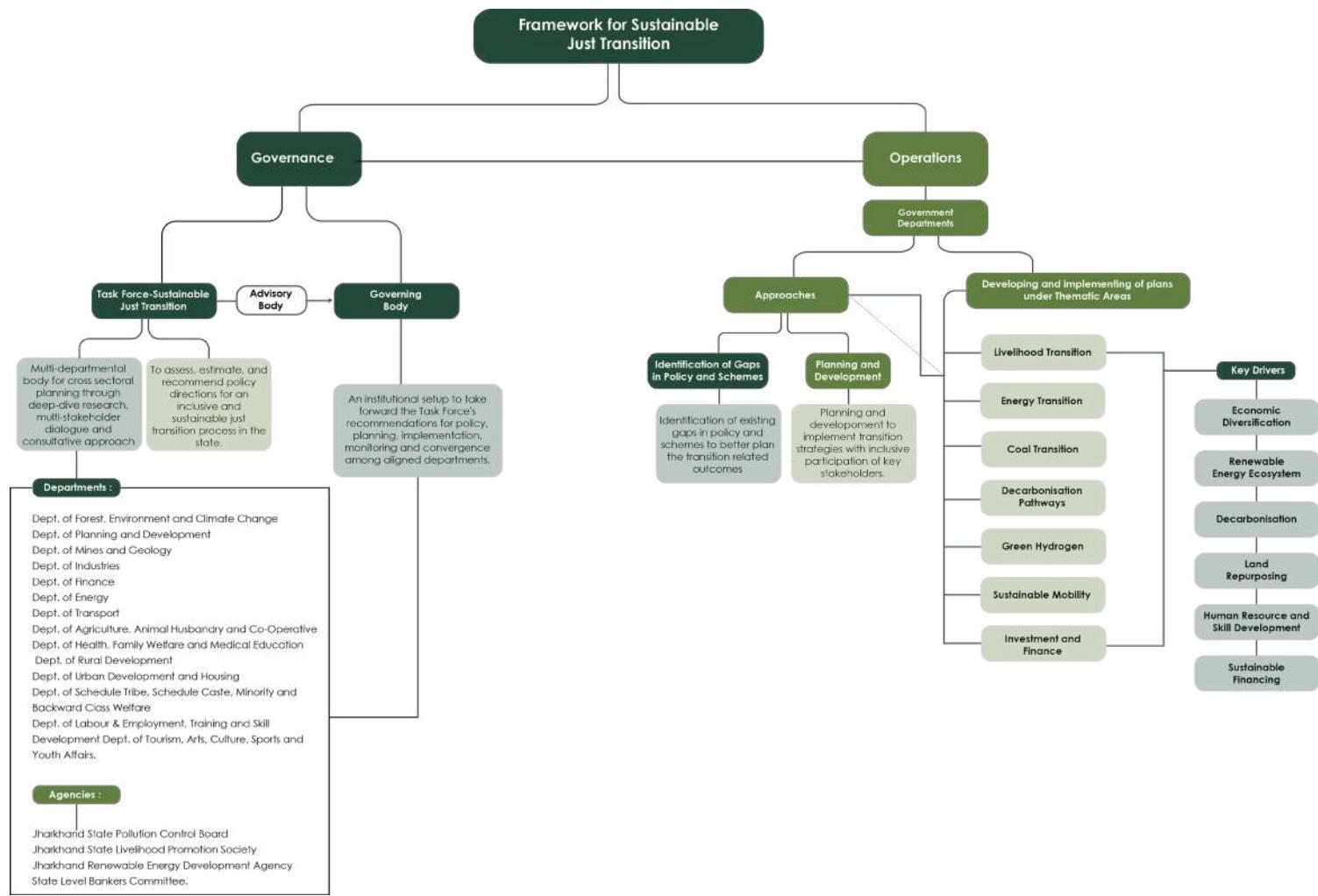
Effective governance is critical to drive a sustainable just transition. At present, Jharkhand's just transition is being steered by the Task Force on Sustainable Just Transition, constituted by the Government of Jharkhand. The Task Force acts as a multi-departmental recommending body, comprising representatives from 18 key state departments and agencies.

It has been instrumental in facilitating multistakeholder dialogue, deep dive research through best case studies analysis, developing cross-sectoral roadmaps, and building a shared vision for transition. However, its mandate is time-bound and primarily advisory in nature.

Several studies have underscored the importance of a framework and guidelines to plan the long-term process of just transition.<sup>41,42,43</sup> These approaches are national in scope and lack the specificity required to address unique state-level contexts.

As Jharkhand advances further on the path of sustainability, a dedicated, permanent governance mechanism will be essential to ensure continued coordination, policy implementation, and dynamic response to emerging challenges.

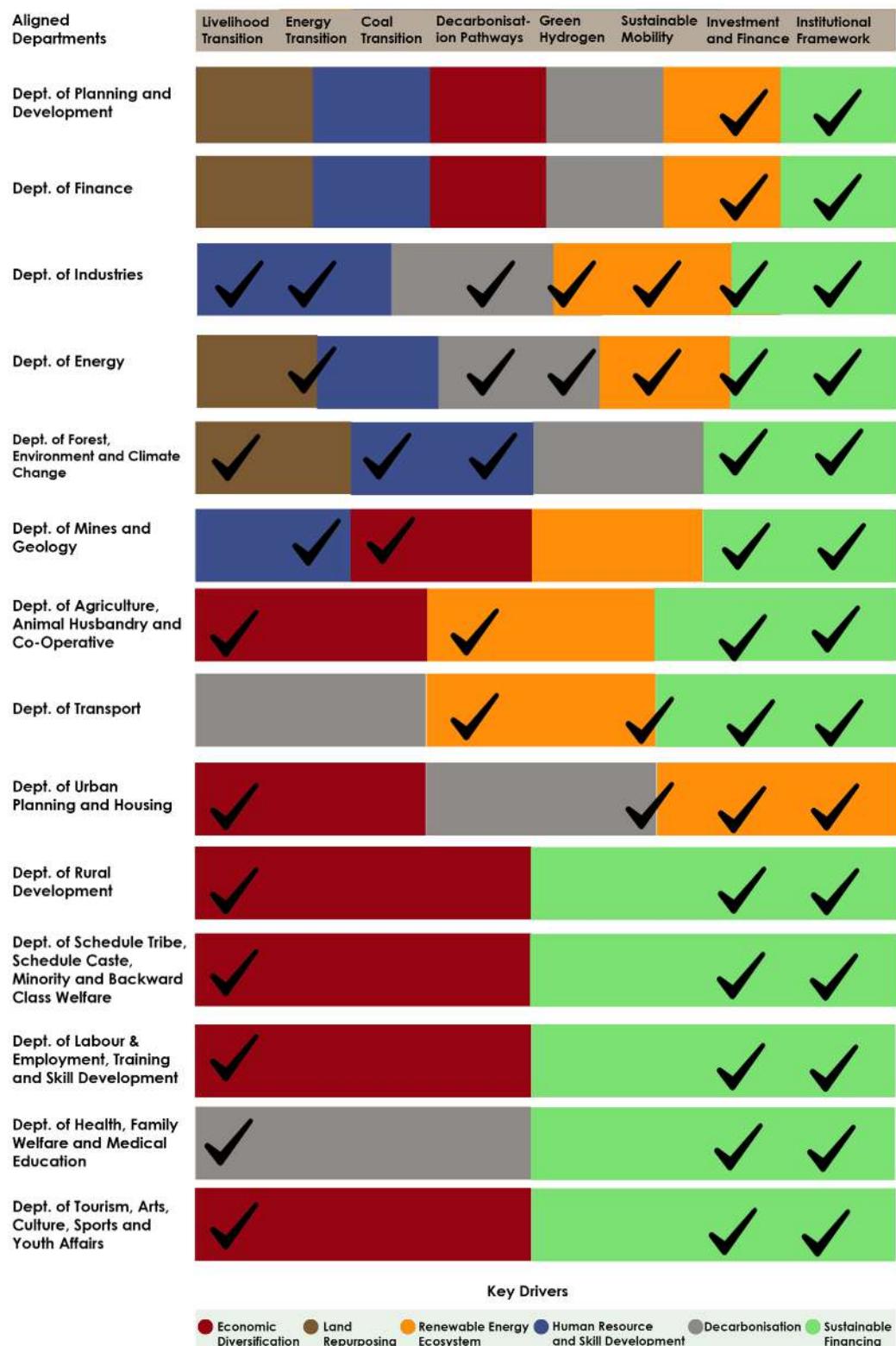
Establishing such a governance framework will be crucial to embedding sustainable just transition principles into Jharkhand's broader development planning processes, aligning departmental strategies, and sustaining momentum over the coming decades.



**Figure 17:** A Schematic Representation of the Framework of Sustainable Just Transition in Jharkhand

## 6.5 Operational Framework

To operationalise the sustainable just transition process, identifying gaps in existing policies and schemes is essential for better planning of transition outcomes. Planning and development efforts should focus on implementing strategies through the inclusive participation of key stakeholders. Aligned departments will coordinate across policy formulation, planning, implementation, monitoring, and evaluation. The alignment of responsible departments with the eight thematic areas and key drivers is presented below:



**Figure 18:** An Illustrative Example of Key Drivers and Interlinkages with Aligned State Departments

## 7. Way Forward

Jharkhand's state-specific framework for a just and sustainable transition is designed to address its unique socio-economic and environmental challenges. It emphasizes promoting alternative livelihoods, economic diversification, comprehensive social protection for affected communities, encouraging decarbonization, finding clean energy alternatives and deployment.

- » As Jharkhand moves toward a low-carbon, climate-resilient economy, its tailored strategies, institutional arrangements, and policy innovations provide a strong foundation for inclusive and equitable growth.
- » The framework is developed for Jharkhand, it has relevance for other fossil fuel-dependent states facing similar challenges.
- » The sustainable just transition requires long-term early planning, continuous effort, and the flexibility to respond to evolving circumstances. Regular review and updates is essential to ensure its effectiveness.



# Endnotes

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# Glossary

**Climate Resilience:** The ability of people, communities, and ecosystems to prepare for, respond to, and recover from climate change impacts (like floods or heatwaves), while minimizing damage and building long-term adaptive capacity.

**Coal Dependency:** The economic and social reliance of a region or country on coal mining, production, or consumption, often making transition efforts more complex and sensitive.

**Energy Modeling:** A method that uses simulations to analyze and forecast energy production, distribution, and consumption. It helps optimize energy systems for goals like reducing emissions or improving energy security.

**Environmental Co-benefits:** Positive side effects of climate actions-like cleaner air, better public health, or biodiversity protection-that go beyond emission reductions.

**Green Economy:** An economy that promotes sustainable development while minimizing environmental harm. It's environmentally responsible, socially inclusive, and economically viable in the long term.

**Green Hydrogen:** Hydrogen fuel produced using renewable electricity (like wind or solar), offering a clean energy option for heavy industry, transport, and power.

**Hard-to-Abate Sectors:** Industries like steel, cement, aviation, and shipping that are technically or economically challenging to decarbonize due to high energy needs and limited low-carbon alternatives.

**Inclusive Development:** Development that ensures equity and equal opportunities, especially for marginalized or disadvantaged groups during the climate transition.

**Low Carbon Development:** An approach to growth that reduces greenhouse gas emissions, especially CO<sub>2</sub>, while promoting sustainability, improving livelihoods, and reducing poverty.

**Nationally Determined Contributions (NDCs):** Climate action plans submitted by countries under the Paris Agreement, outlining how they will cut emissions and adapt to climate change.

**Net-Zero Emissions:** It denotes balancing greenhouse gas emissions with removals (e.g., via forests or technology), so that the net total is zero.

**Sustainable Mine Closure:** The process of closing coal mines or other extractive sites in a way that restores ecosystems, ensures safety, supports workers, and enables community transition.

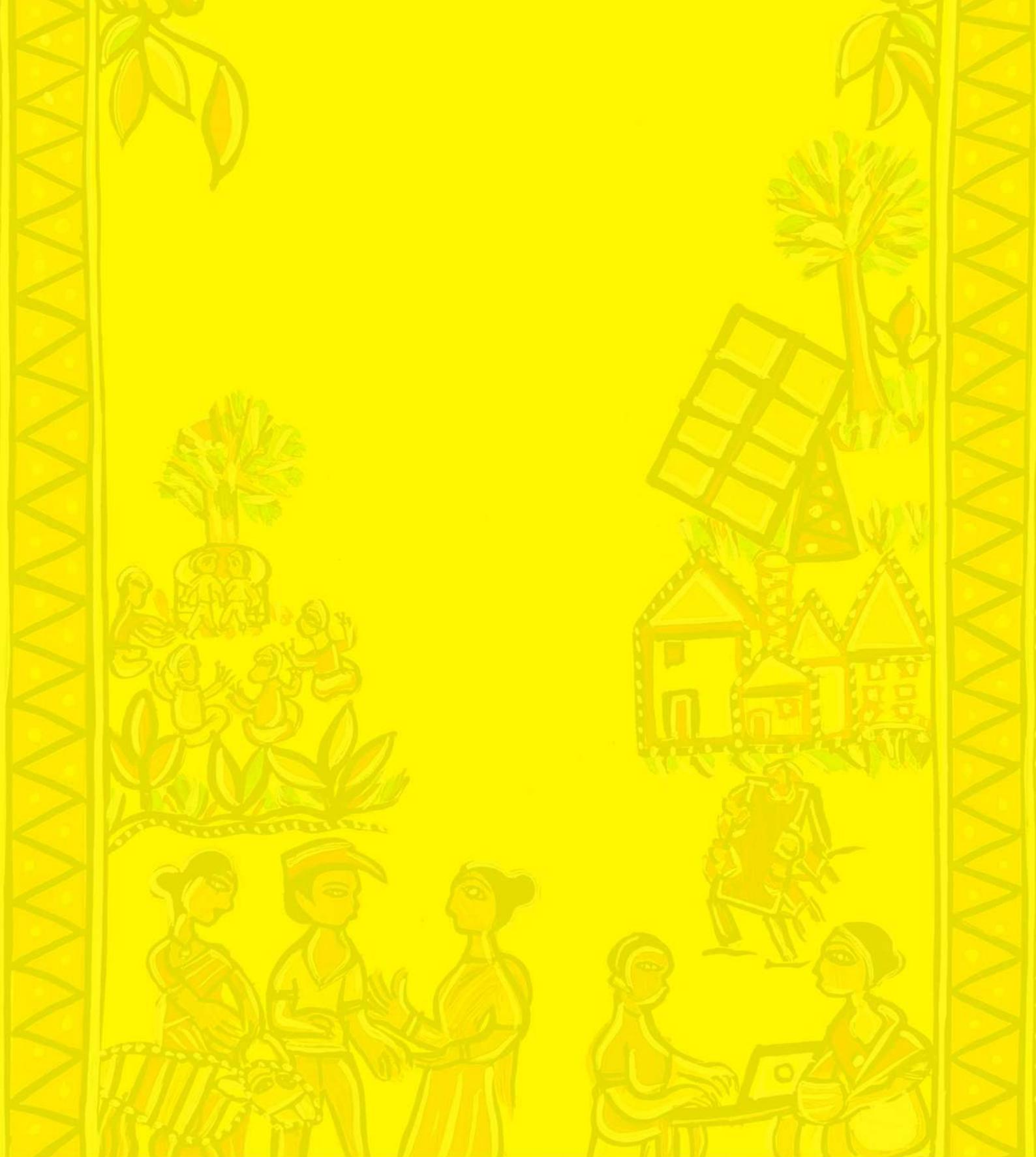
**Sustainable Mobility:** Transportation that is eco-friendly, efficient, inclusive, and reduces reliance on fossil fuels—like public transit, cycling, walking, and electric vehicles.

**Workforce Reskilling / Upskilling:** Training programs aimed at helping workers in declining sectors (like coal or oil) gain new skills for emerging green jobs in clean energy, tech, or sustainability.

**Carbon Markets:** Trading systems where countries, companies, or entities buy and sell carbon credits or allowances to meet emission reduction targets efficiently.

**Carbon Neutrality:** Also known as net-zero carbon emissions, this refers to balancing the amount of CO<sub>2</sub> emitted with the amount removed or offset—resulting in zero net carbon emissions.





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