

Managing Energy, Economic, and Environmental Transition

Workshop Report

By Neelima Jain

Executive Summary

The transition from coal-dependent economies to ones driven by sustainable energy sources presents a global challenge in balancing climate action, energy access, and economic development. The “just transition” concept recognizes the importance of addressing societal impacts, environmental sustainability, governance, and financial mechanisms in this process. Countries such as India, South Africa, and the United States, each with their distinct socioeconomic landscapes, underscore the necessity for collaborative efforts and knowledge sharing to facilitate successful regional transitions.

To address these challenges and explore subnational strategies for managing energy, economic, and environmental transitions, the Center for Strategic and International Studies (CSIS), in partnership with the Indian Institute of Technology Kanpur, hosted an invitation-only hybrid workshop on July 27, 2023, in New Delhi, India. The workshop aimed to connect stakeholders from India, South Africa, and the United States to share experiences, policy mechanisms, and technical considerations for navigating transitions at the subnational level.

The workshop featured four sessions focusing on (1) governance, (2) economic revitalization and diversification, (3) infrastructure repurposing and environmental remediation, and (4) workforce and skill development. Each session included presentations by expert speakers, audience engagement, and reflective discussions on the lessons learned. The event attracted 46 officials and practitioners from 11 states and provinces, providing a valuable platform for direct engagement and exchange of insights across various contexts. Several key takeaways emerged from the prolific discussions:

GOVERNANCE IN TRANSITION: POLICIES AND REGULATIONS

- Navigating the transition from a coal-dependent economy becomes intricately challenging when balanced with urgent developmental imperatives.
- Policy and legislative initiatives reflect growing, ambitious regional climate commitments, yet they confront social, economic, and legacy issues, risking an unplanned and inequitable transition.
- Community engagement underscores the potential for collaborative, bottom-up approaches to planning a just transition.

ECONOMIC REVITALIZATION AND DIVERSIFICATION

- Ensuring broad-based development dividends from the transition—beyond simply mitigating impacts in coal-mining regions—is crucial for garnering widespread political and popular support.
- The rising industrial demand for renewable energy is accelerating such transitions, but balancing long-term sustainability with immediate economic needs is essential to maintaining momentum in clean energy advancements.
- Communication strategies that align with local sentiments and openness to change can foster community-led economic diversification.

INFRASTRUCTURE REPURPOSING AND ENVIRONMENTAL REMEDIATION

- It is never too soon to start planning for a transition.
- Trade-offs are inevitable when balancing immediate reliability needs with the overarching goal of transitioning to a clean energy future.
- Redevelopment and remediation of thermal assets (such as coal-fired power plants and waste incinerators) should prioritize local benefits when addressing the essential elements of job creation, economic diversification, and sustainable development.

WORKFORCE AND SKILL DEVELOPMENT

- Tangible, on-the-ground projects that demonstrate the feasibility and benefits of sustainable transitions motivate wider community involvement in workforce development.
- Leveraging local resources to create sustainable economic opportunities promotes a proactive framework for training a more adaptable and skilled workforce.
- Nurturing green skills is vital for ensuring the inclusivity of the green economy and integrating communities into the future workforce.

This report serves as a comprehensive overview of the discussions, aimed at aiding participants and informing those not in attendance about collaborative opportunities and transition pathways explored during the event.

Introduction

Balancing climate action, energy access, and economic development during an energy transition presents unique social, economic, and political challenges, especially for coal-dependent economies

that are deeply influenced by regional contexts. The concept of a “just transition” integrates critical considerations such as societal impacts, environmental sustainability, governance, and financial mechanisms. For instance, India, a rapidly growing economy that is also highly vulnerable to climate change, places a strong **emphasis** on ensuring energy security and providing affordable energy access within its climate strategy, and thus is **yet to initiate** its transition away from coal. Meanwhile, South Africa’s approach to the energy transition is driven by meeting its developmental needs through the **lowest-cost pathways**. In the United States, the prolonged downturn of the coal market, coupled with consequential industrial restructuring and subsequent **unplanned transitions**, has brought social sustainability to the forefront of planning for a just transition.

Despite the diverse socioeconomic landscapes in these countries, common concerns related to community welfare and broader economic development resonate in both the Global South and North, emphasizing the necessity for collaboration and knowledge sharing to assist regions and communities in building shared success models. The unfolding of a regional transition is heavily influenced by state and local governments, which retain firsthand knowledge of the transition’s local impacts and play an essential role in reorienting the economy away from coal. In this context, a subnational collaborative platform could facilitate strategic exchange among stakeholders, inspire subnational entities to seek opportunities to leverage change, and identify unique pathways toward a just transition.

To help stakeholders share their experiences in planning and managing transitions at the subnational level, CSIS—in partnership with the Indian Institute of Technology Kanpur—organized an invitation-only hybrid workshop titled “Managing Energy, Economic, and Environmental Transition: A Subnational Exchange.” The full-day, interdisciplinary event was held on July 27, 2023, in New Delhi, India, and brought together policymakers, practitioners, and experts from the Global South and North.

The workshop took place in accordance with the **Chatham House Rule**, and the opinions shared reflect those of the attendees alone. This report aims to serve as a summary record for the participants and offers a broad overview of the discussions for those not present.

PURPOSE

This private, interactive workshop offered opportunities for direct connections between subnational peers from India, South Africa, and the United States. Participants from local, state, and national governments, non-governmental organizations, and academia shared experiences, policy mechanisms, and technical considerations for navigating transitions at the subnational level.

Specific objectives were to:

1. Share knowledge and on-the-ground perspectives on challenges, impacts, and strategies for subnational policymakers who anticipate or are currently managing transitions;
2. Establish a dependable network of policymakers and practitioners for sharing contextually appropriate solutions to tackle immediate transition challenges; and
3. Build a common understanding of the risks of unmanaged and unprepared transitions.

The desired outcomes of the workshop were to:

1. Foster direct connections among stakeholders to enhance the exchange of insights relevant across various contexts;

2. Generate practical examples of regional economic regeneration to inspire policymakers; and
3. Compile a publicly accessible workshop report documenting discussed challenges, examples of transitions in practice, and collaborative opportunities.

OUTLINE OF THE WORKSHOP

The workshop was anchored around four sessions, each with a separate area of focus:

1. **Governance in Transition: Policies and Regulations:** This session explored how policy and regulatory tools can enable a well-planned transition process.
2. **Economic Revitalization and Diversification:** This session discussed the different strategies for economic revitalization and diversification.
3. **Infrastructure Repurposing and Environmental Remediation:** This session highlighted innovative and efficient ways to remediate and repurpose coal-based assets.
4. **Workforce and Skill Development:** This session discussed strategies for enhancing workforce resilience.

Each session spanned approximately 75 minutes and featured four speakers alongside a moderator. Sessions commenced with panelists providing opening remarks to establish context and offer various perspectives on the topic. The remainder of the panel was dedicated to fostering group discussions, engaging with audience queries, and introducing fresh insights. Each session culminated in a reflective discussion on lessons gleaned from personal experiences.

WORKSHOP ATTENDANCE

A diverse range of local stakeholders involved in the energy transition in India, South Africa, and the United States participated in the workshop. The event provided a platform for direct engagement with 46 officials and practitioners, including representatives from 11 states and provinces. Below is a breakdown of the number of attendees at the workshop.

Figure 1: Workshop Attendees



Source: CSIS Energy Security and Climate Change Program.

Session 1: Governance in Transition: Policies and Regulations

This session focused on crucial elements of planning for the transition away from coal, underscoring the necessity of crafting a long-term strategy to navigate the associated complexities and risks. The four panelists—from Tamil Nadu and Jharkhand in India, South Africa, and Minnesota in the United States—articulated the multifaceted challenges of transitioning from a coal-based economy to one relying on more sustainable energy sources, emphasizing the need for comprehensive planning and customized solutions to ensure a just and equitable transition for all stakeholders. The discussion provided a deep dive into region-specific approaches. The following questions guided the session:

- What policies are being implemented to balance energy accessibility, affordability, and equitability in the energy transition?
- What consultative process led to the creation of South Africa's **Just Transition Framework** and its supporting coalition?
- What policy instruments and resources are available to Indian state governments to alleviate the challenges of transitioning to a low-carbon economy?
- What innovative strategies have communities used to enhance state-level planning?

KEY TAKEAWAYS

1. Navigating the transition away from a coal-dependent economy becomes intricately challenging when balanced with urgent developmental imperatives, as demonstrated by cases from various regions.

- In South Africa, the reliance on coal has spurred industrial growth but also entrenched an energy-intensive economy that now struggles to pursue environmental sustainability and economic resilience amid a global shift toward cleaner energy. Severe social challenges in coal-rich areas such as Mpumalanga amplify the urgency for a transition strategy that is both sustainable and inclusive, aiming to balance economic development with addressing poverty, inequality, and unemployment.
- Tamil Nadu's ambition to harness renewable energy is limited by the state's lack of commercially viable storage options and its reliance on coal for energy security and affordability. The speaker also noted that in a rapidly growing economy, the state-owned utilities prioritize providing uninterrupted, high-quality power at affordable rates to consumers, often placing environmental and climate change concerns lower on their list of priorities.

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- Minnesota's landscape, rich in forests and minerals in the north and east and dominated by agriculture in the south and west, presents unique challenges and opportunities for

the energy transition. This diversity impacts the state's industrial activities and energy production, with historical reliance on coal in areas with extractive industries.

- Jharkhand, with its rich mineral resources, has played a historical role in India's industrial development, particularly through steel production and significant contribution to India's coal supply. This energy-intensive industrial base and the state's heavy reliance on coal underscore the complexities of transitioning to renewable energy in a region critical to the country's energy security.
- The speakers recognized the challenges of broaching energy transitions in coal-centric regions, given apprehensions about job losses and earnings. Transitions entail more than just shifting energy sources; they require addressing revenue losses, establishing new infrastructure, and ensuring a fair and inclusive process for all stakeholders.

2. Policy and legislative initiatives reflect growing and ambitious regional climate commitments, yet they confront social, economic, and legacy issues, risking an unplanned and inequitable transition.

- South Africa is confronting significant pressure to decarbonize its economy while staying globally competitive. The speaker acknowledged that the imperative to shift away from coal is driven by the need to comply with national air quality standards, meet international trade criteria, and overcome the financial and insurance obstacles linked to new coal projects. This shift is intensifying the challenges of effectively delivering social support, providing reskilling opportunities, and facilitating job creation for individuals impacted by the decommissioning of coal plants.
- Tamil Nadu has set a bold target to increase the share of renewable energy in its generation mix to 50 percent by 2030. However, legacy issues among the state's utility companies are widening the gap between the potential and actual use of renewable energy resources. The speaker stressed the importance of the financial wellbeing of these companies to an effective energy transition while highlighting the key obstacles plaguing the sector, including overleverage, mounting debts, and failed federal reforms.
- Minnesota has set ambitious climate-related goals, including setting a renewable energy standard and a target for 100 percent clean energy by 2040. The state has made significant strides in reducing its dependence on coal, with coal generation decreasing from 65 percent of electricity production in 2003 to 25 percent in 2020. While acknowledging the anxiety and resistance in some communities facing the retirement of coal plants, the speaker underscored the importance of stakeholder engagement, local labor provisions, and long-term planning through integrated resource-planning processes.
- In 2022, Jharkhand distinguished itself as India's first state to establish a "Just Transition Task Force," accompanied by the publication of a **vision document** detailing the transition strategy. The speaker highlighted the critical need to shift away from an economy based on fossil fuels, underlining that this transformation will demand comprehensive planning, infrastructure enhancement, and economic diversification.

3. Community engagement offers the potential for collaborative, bottom-up approaches to planning a just transition.

- The speaker from South Africa highlighted the critical need for inclusive stakeholder engagement in transition planning, particularly for involving highly impacted communities through multiple consultation rounds. He stressed the importance of engaging with these communities in their native languages and including cultural and logistical considerations to ensure meaningful participation in the transition planning processes.
- The speaker from Tamil Nadu emphasized communities' increasing recognition of the economic and environmental advantages of renewable energy, citing initiatives such as rooftop solar projects as effective tactics for promoting renewable energy at the grassroots level.
- The speaker from Minnesota underscored the state's effective initiatives in community engagement and economic diversification for transitioning regions. Advocating for a grassroots approach, the speaker urged drawing inspiration from local innovations, fostering intercommunity connections to exchange experiences, and customizing transition strategies to suit specific local needs and opportunities.

BEST PRACTICES

The panel discussions uncovered a wealth of effective working examples, best practices, and innovative approaches to common challenges. These insights hold potential for adaptation and application across various regions.

- Minnesota's integrated resource planning has promoted community participation and offers a 15-year window for transition preparation, providing essential time for adjusting and facilitating smoother transitions. The state's comprehensive approach to energy transition, which focuses on local engagement, has also led to communities collaborating with the state and utilities. Together, they have worked to diversify tax bases, invest in infrastructure, and develop renewable energy projects to mitigate the impact of coal-plant retirements.
- The Presidential Climate Commission has been pivotal for South Africa, driving transformational economic change through consensus building and inclusive governance. The commission created a **Just Transition Framework** to guide the country through economic diversification, revitalization, and the securing of finance while emphasizing procedural justice and stakeholder engagement.

OPPORTUNITIES TO COLLABORATE

Jharkhand in particular is eager to partner with local and international entities in the following key areas:

- **Decarbonizing Hard-to-Abate Industries:** International collaboration can provide access to advanced technologies, expertise, and financial resources that might not be available domestically.

- **Overseeing Land Reclamation and Economic Diversification:** As part of a wider strategy to shift the state's economic reliance away from coal, Jharkhand faces the challenge of converting former coal-mining lands to tourism and other productive uses.
- **Developing the Workforce:** Collaborations are sought in skilling, reskilling, and upskilling employees for new industries and technologies, with a specific call for investments in workforce development due to a gap in local manufacturing for emerging technologies such as green hydrogen.

Session 2: Economic Revitalization and Diversification

This session allowed for a comprehensive and insightful discussion on the multifaceted challenges and strategies related to economic diversification and the clean energy transition in regions previously or currently dependent on coal. The panel—consisting of participants from the Indian states of Odisha and Telangana, South Africa, and the U.S. state of West Virginia—delved into innovative approaches to navigating challenges and seizing opportunities associated with shifting toward a more diversified and sustainable economic foundation. The following questions guided the session:

- What are some guiding principles that could enhance the political feasibility of a just transition?
- What types of policy solutions does Telangana need to mitigate the economic impacts of the impending energy transition?
- How is Odisha's new renewable energy policy approaching the state's just energy transition?
- How does an economic diversification plan ensure energy access?

KEY TAKEAWAYS

1. **Ensuring broad-based development dividends from the transition, beyond simply mitigating impacts in coal-mining regions, is crucial for garnering widespread political and popular support.**
 - The low-level support for energy transitions among the general populace is attributed to immediate economic challenges that tend to overshadow long-term climate goals.
 - Prioritizing an equitable energy transition, especially by improving energy access and empowering households to participate in value-added economic activities, will significantly increase political support for sustainability goals and pave the way for communities to adopt alternative economic pathways.
 - The speaker from Odisha emphasized a pragmatic approach to the energy transition, highlighting the necessity of maintaining reliable baseload power to foster ongoing industrial development and ensure broad-based economic growth. Considering the state's rapidly rising energy demand, a hasty departure from coal risks significant socioeconomic and political repercussions.

The low-level support for energy transitions among the general populace is attributed to immediate economic challenges that tend to overshadow long-term climate goals.

2. The rising industrial demand for renewable energy is accelerating such transitions, but balancing long-term sustainability with immediate economic needs is pivotal for maintaining momentum in clean energy advancements.

- Telangana's industrial sector has seen notable investments, boosting job creation and economic development. However, transitioning to sustainable energy sources necessitates prudent policymaking to ensure that these industries, including the state's globally competitive pharmaceutical sector, remain viable and competitive.
- Odisha's transition toward sustainable growth necessitates balancing economic advancement and environmental stewardship. There is a noticeable shift in the readiness of industries to invest more in green energy—yet ensuring electricity remains affordable for households and industries is a pivotal concern in this transition.
- The speaker from West Virginia emphasized the complex interplay between national policies and state initiatives, illustrating how political shifts can swiftly affect the trajectory of an energy transition. The speaker highlighted the private sector's growing demand for renewable energy as a key catalyst for change, stressing the importance of aligning state policies with market needs and opportunities.

3. Communication strategies that align with local sentiments and openness to change can foster community-led economic diversification.

- Understanding the impact of language in coal-dependent communities is crucial for fostering acceptance of economic changes. Emphasizing terms such as “energy diversity” and “economic diversification” (rather than “just transition”) can resonate more effectively with locals, highlighting the importance of employing communications strategies that are both sensitive and impactful.
- Direct engagement with communities historically dependent on coal reveals a shared interest in economic diversification across different areas and a willingness to explore new economic paths. This engagement strategy highlights the potential for collaborative grassroots efforts to facilitate economic transitions.

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BEST PRACTICES

- Recognizing the challenges of transitioning from coal, the state of Telangana compensates industries that adopt cleaner energy sources. This approach aims to balance the additional costs of sustainable practices with the need to remain competitive, particularly in the international market.

- West Virginia is aligning its economic development strategies with environmental protection by attracting companies that thrive in a low-carbon economy. Investments in low-carbon steel manufacturing, titanium parts for aerospace made using renewable energy, electric school buses, outdoor recreation vehicles, and grid-scale batteries exemplify the state's commitment to creating jobs in new, sustainable industries.

OPPORTUNITIES TO COLLABORATE

- Telangana is keen to engage in partnerships aimed at decarbonizing its industrial sector. The state has been a hub for various industries, including the life sciences, defense, aerospace, machine tooling, and electronics. The state recognizes the value of international collaborations in exchanging best practices and proven strategies for achieving industrial decarbonization.
- Odisha is actively seeking partnerships to enhance its ability to create a comprehensive skill development repository to facilitate a just transition in the state. This endeavor aims not only to compile an extensive array of skills, but also to align them directly with emerging job opportunities in the green economy.

Session 3: Infrastructure Repurposing and Environmental Remediation

Speakers from Maharashtra in India, South Africa, and the U.S. states of California and West Virginia shared their insights on the complexities and strategic approaches toward thermal infrastructure repurposing and environmental remediation. The discussions highlighted innovative strategies for making use of coal-fired power stations, with a focus on sustainable economic development and the shift toward renewable energy sources. Despite the varied geographical contexts, a common narrative emerged on the need for a balanced approach that harmonizes policy, engages communities, and addresses the economic implications of energy transitions. The following questions guided the session:

- Is repurposing coal power plants an economic and environmental consideration in Maharashtra? If yes, what resources and policy instruments are available to the state government to implement this?
- How is California balancing grid reliability with grid decarbonization? How is it approaching the decommissioning or repurposing of fossil fuel infrastructure?
- What are some examples of environmental remediation programs that may have helped establish the preconditions for economic prosperity?
- What challenges have local utilities encountered in repurposing thermal power plants? And what solutions have they come up with to address these challenges?

It is never too soon to start planning for a transition.

KEY TAKEAWAYS

1. It is never too soon to start planning for a transition.

- The key lesson from speakers' experiences was the importance of taking early and strategic actions to prepare for the transition. By identifying and implementing beneficial projects

ahead of thermal power station shutdowns, it is possible to address the “justice” component of the energy transition and mitigate negative impacts and narratives.

- California employs a comprehensive, forward-looking approach in its integrated resource planning that considers emissions, costs, and the buildout of clean energy infrastructure over both the short (10 years) and long term (25 years).
- Initiating the planning and execution of transition strategies at an early stage is crucial. Doing so provides ample opportunity to safeguard environmental health and fortify the resilience of communities that have historically relied on industries such as coal, timber, and natural gas.
- One speaker emphasized the importance of early and effective communication with stakeholders to align expectations and mitigate resistance to change. Engaging communities and stakeholders from the outset in the planning and execution of transition projects is crucial for building broad-based support.

2. Trade-offs are inevitable when balancing immediate reliability needs with the overarching goal of transitioning to a clean energy future.

- One speaker acknowledged the short-term trade-offs and challenges in transitioning to a clean energy future, including the potential retention of natural gas plants to ensure reliability during periods of high demand.
- California’s approach of taking thermal fleet assets offline but retaining them for critical needs illustrates a pragmatic strategy to balance reliability with environmental goals.

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3. Redevelopment and remediation of thermal assets should prioritize local benefits when addressing the essential elements of job creation, economic diversification, and sustainable development.

- Bridging capacity gaps in rural areas empowers communities to embark on redevelopment projects, including obtaining federal funds for the remediation of mine land and economic diversification.
- Starting transition activities that do not impact the operations of existing power stations, such as building solar plants nearby or initiating community development projects, were described as “options of no regret.” These actions lay the groundwork for a smoother transition by establishing economic alternatives and community benefits well before the shutdown of coal-fired stations.

- Establishing training centers for renewable energy skills and community development initiatives such as early childhood centers, clinics, and libraries are integral to ensuring that the transition benefits the wider community, not just those directly employed by the energy sector.
- The concrete plan for transitioning includes repowering coal-fired stations with renewable energy sources and repurposing the land for new economic activities. For example, the Komati Power Station in Mpumalanga, South Africa, is set to host solar, wind, and battery-storage projects alongside agrivoltaic (a combined land-use system that integrates solar photovoltaic panels with agricultural production) and manufacturing facilities, serving as a model for how decommissioned coal plants can be given a second life.

BEST PRACTICES

- Prior to shutting down stations, assessments should be conducted to understand the socioeconomic impacts of doing so on local communities and identify opportunities that arise from the transition. This proactive approach helps to stabilize the economy and support community development through targeted initiatives.
- California’s holistic approach to environmental stewardship and equity includes an emphasis on accurate carbon accounting, ecological restoration, reforms related to Indigenous land, and the use of carbon market revenues to support disadvantaged communities.
- A unified approach to sustainable redevelopment is important, including collaboration among consulting firms, community organizations, and local governments to develop viable proposals and secure funding for community-based projects.

OPPORTUNITIES TO COLLABORATE

- Maharashtra is proactively seeking to collaborate on addressing the economic barriers hindering the adoption of green hydrogen in the state.

Session 4: Workforce and Skill Development

This session—featuring speakers from the Indian state of Madhya Pradesh, South Africa, and the U.S. states of Ohio and West Virginia—focused on identifying the most impactful policy instruments for developing human capital in regions previously or currently reliant on coal. It also explored various approaches to bolstering workforce resilience. Participants shared thoughtful perspectives on overcoming the economic challenges, identity crises, and workforce restructuring necessitated by the shift away from coal in these communities. The following questions guided the session:

- How should the quality of replacement jobs—including aspects such as their location, salary, benefits, and opportunities for advancement—be considered to ensure overall improvements in social welfare rather than merely substituting one job for another?
- What skill-building strategies are being developed to prepare for future needs and to ensure the workforce is capable of supporting increasing demand for renewable energy and a clean economy?
- What are some strategies for engaging and training individuals across different life stages, especially those who may be hesitant to embrace new opportunities?

KEY TAKEAWAYS

1. **Tangible, on-the-ground projects that demonstrate the feasibility and benefits of sustainable transitions motivate wider community involvement in workforce development.**
 - Addressing agricultural practices and diversifying revenue streams for farmers can enhance resilience against changing weather patterns and contribute to soil health and carbon sequestration.
 - One speaker highlighted innovative projects, such as extracting iron-oxide pigment from acid mine drainage for commercial use, demonstrating how environmental challenges can be turned into economic opportunities.
 - Embracing the entrepreneurial spirit of local communities can help drive the transition. This includes treating social enterprises as efforts in economic research and development that demand flexibility, experimentation, and a willingness to learn from failures.
2. **Leveraging local resources to create sustainable economic opportunities promotes a proactive framework for creating a more adaptable and skilled workforce.**
 - One speaker highlighted discussions with developers interested in renewable energy projects that leverage local human and natural resources, underscoring the need to integrate local communities and resources into the sustainable development agenda.
 - One speaker emphasized the significance of fostering a sense of pride and dignity in new industries that resonate with a community's historical contribution to the nation, suggesting that sectors such as renewable energy and sustainable agriculture can offer a fresh sense of purpose.

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3. **Nurturing green skills is vital to the inclusivity of the green economy, ensuring the integration of communities into the future workforce.**
 - One speaker stressed the critical need for “green skills” development to support green industries and investments, with a focus on creating jobs that not only contribute to environmental goals but also socioeconomic development.
 - One speaker emphasized the importance of training the next generation for jobs in green energy and other future-oriented sectors. The challenge is not so much in retraining current workers in coal-based industries, as these jobs are expected to remain for the foreseeable future, but in preparing new entrants to the workforce for emerging green technologies and industries.

BEST PRACTICES

- Incubating social enterprises as a strategy to create jobs in emerging sectors such as solar energy, construction, sustainable agriculture, and ecotourism is important for diversification to reduce vulnerability associated with mono-economies.
- Asset-based economic development focuses on leveraging local assets to foster growth and entrepreneurship, emphasizing the need for community-driven and creative solutions to economic challenges.

OPPORTUNITIES TO COLLABORATE

- The speaker from Madhya Pradesh saw potential for collaboration between Indian and U.S. academic institutions and industries to align vocational training and university curricula with the demands of future industries, particularly in renewable energy, thereby addressing the skills gap.

Recommendations

The complexity of energy transitions necessitates a multifaceted approach that includes stakeholder engagement, economic incentives, strategic planning, and investment in alternative economic pathways. Ensuring a just and equitable transition requires understanding and addressing the unique needs and capacities of different communities alongside the broader goals of energy security and climate change mitigation.

- **Include and engage stakeholders in policy formulation.**
A consensus exists on the importance of engaging a broad spectrum of stakeholders, including industry representatives, civil society, community groups, and non-governmental organizations, right from the initial stages of policy development. It is crucial to also include Indigenous populations and local communities, particularly regarding local resources. Such an approach ensures that policies are well informed, widely accepted, and reflective of diverse perspectives and needs.
- **Foster community engagement through transparent communication.**
Officials should tailor outreach strategies to different communities, recognizing that the rationale of climate change may not resonate with everyone. Economic incentives and practical benefits (e.g., cleaner cooking solutions) should be leveraged to facilitate participation in the energy transition. Effective and honest communication about the realities of economic transition, coupled with genuine engagement with communities, is necessary to build trust and support for transition initiatives.
- **Focus on tangible benefits and early wins.**
Demonstrating the rewards of transition projects early on can help garner community support and build momentum for further initiatives. This includes showcasing successful examples of land restoration, renewable energy projects, and new employment opportunities created through transition efforts. It is vital to develop and implement economic incentives that encourage communities to transition from fossil fuels to cleaner energy sources.
- **Engage in strategic and early planning.**
A phased approach to transition planning should distinguish between short-, medium-, and long-term strategies. This includes assessing which fuels and technologies will play pivotal roles in ensuring energy security and economic growth.

- **Take economic drivers and climate change into account.**
Economic drivers will be crucial in guiding the energy transition, as will addressing climate change. The goal should be to reduce the carbon footprint of development while ensuring energy security.
- **Plan around local skills and comparative advantages.**
Policymakers should consider the skills and comparative advantages of communities and regions when planning economic diversification and infrastructure development. This requires significant investment in identifying viable alternatives to coal and other industries reliant on fossil fuels.
- **Avoid negative outcomes through advance action.**
Drawing on lessons from past experiences, such as the decline of coal communities, policymakers should underscore the importance of taking proactive measures now to prevent negative outcomes in the future. This includes anticipating challenges that are likely to arise rather than waiting until they become imminent or unavoidable.
- **Form public-private partnerships for technical implementation.**
Long-term partnerships that leverage technical expertise from the public sector, academia, and industry are essential not just for planning but also for the successful implementation of transition projects. These partnerships can drive innovation, provide necessary technical support, and ensure the viability and sustainability of projects.

Breaking out of the self-reinforcing cycle of coal dependency will necessitate two primary considerations for policymakers in coal regions: (1) the remediation and repurposing of former mining lands and legacy coal assets to lay the groundwork for future economic growth; and (2) multidecade planning for a just transition that is holistic and multidisciplinary. The **experiences** of former coal powerhouses in the Global North have shown that a just transition requires a couple of decades to plan. A prolonged coal transition will provide emerging economies time to build a framework for a well-functioning and sustainable post-coal future. Planning should thus begin now. ■

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