14TH INDIA - U.S. TRACK II DIALOGUE ON **ENERGY COOPERATION**

19-20 MAY 2025

WASHINGTON D.C

14th India – U.S. Track II Dialogue on Energy Cooperation

Outcome Document

The Ananta Aspen Centre and Aspen Institute Energy and Environment Program, with inputs from the Center for American Progress and the World Resources Institute, convened the 14th edition of the India-U.S. Track II Dialogue on Energy Cooperation in Washington, D.C. on 19 and 20 May 2025.

This was the first in-person meeting of the Dialogue since President Trump's return to the White House in January 2025. This year, the Track II Dialogue engaged on key issues related to the two countries' bilateral climate and energy relationship, including breakthrough technologies, climate finance, trade, heating and cooling resilience, supply chains, critical minerals, and action at the subnational level.

The following summary offers a non-attributed overview of the discussions held across the two days.

India State of Play

India's energy and climate transition has accelerated dramatically over the past decade, with significant achievements in renewable energy deployment, policy innovation, and sectoral transformation.

Progress in Energy and Power Sectors

Installed Capacity Growth

India's installed renewable energy capacity has surged from a mere 5 megawatts historically to 25 gigawatts added in the last year alone, reflecting a rapid transformation.

Non-Fossil Share

Non-fossil sources now constitute about 40% of India's total installed power capacity (228 GW), while coal accounts for just over 20%. Solar and wind are the fastest-growing segments.

Distributed Energy Initiatives

The Surya Ghar Yojana aims to bring solar power to 10 million homes, potentially adding 25–30 GW—more than the total deployment across the African continent.

Smart Meter Rollout

India targets 250 million smart meters by 2027 (25 million installed in the last three years), laying the foundation for a more distributed, efficient, and resilient power market.

Storage Integration

Renewables are increasingly paired with storage solutions, improving grid resilience and reducing coal dependence as renewable costs fall and coal procurement costs rise.

Economic Efficiency

Modeling indicates that scaling to 600 GW of renewables by 2030 is more cost-effective than a 500 GW scenario, due to reduced transmission losses and system costs.

Transport and Industrial Sector Developments

Electric Vehicles (EVs)

In FY 2024, India sold 1.6 million EVs, with 94% being two-wheelers. Current subsidies focus on public transport, particularly buses.

Rail Electrification

Indian Railways, responsible for 3% of national emissions, is nearing complete electrification.

Industrial Transition

The National Green Hydrogen Mission is the world's second largest on paper. India is pushing green steel regulations and has expanded solar module manufacturing from 20 GW to 60 GW.

Critical Minerals and Supply Chains

A new critical minerals strategy and a 100 GW solar program are part of the 2024 budget, aiming to enhance domestic manufacturing and reduce reliance on imports.

Emissions Impact and Net-Zero Pathway

- Emissions Reduction: Combined efforts in renewables, EVs, efficiency, and rail electrification could cut emissions by 4 billion tons between 2020 and 2030 compared to baseline projections.
- Net-Zero Ambition: Models suggest India needs to scale to 5.7–6 TW of clean energy by 2070 to achieve net-zero targets.
- Carbon Sink Challenge: Progress on carbon sink goals (e.g., afforestation) remains uncertain and requires renewed focus.

Institutional and Policy Landscape

- Decentralized Climate Action: India's climate policy is driven by domestic action, often aggregated and presented internationally without a continuous, government-led modeling process. This results in policy fragmentation but also pragmatic, development-led progress.
- Budget as a Climate Tool: The national budget is a key vehicle for climate action, with announcements on critical minerals, EVs, and renewable programs, though lacking a unified, long-term framework.
- Green Finance Evolution: India is developing its own green finance taxonomy, with the Finance Commission exploring ways to integrate climate risk into fiscal allocations between central and state governments.

Global Politics and India's Leadership Opportunity

COP Process and Climate Finance

The global climate negotiation process (COP) is increasingly fragmented, with limited prospects for large-scale public finance flows from developed to developing countries.

Emerging Mechanisms

Climate action is shifting toward sectoral and trade-linked agreements, such as the International Maritime Organization's new fuel efficiency framework, which India supported.

Leadership Potential

With the US potentially receding from global climate leadership, India has an opportunity to shape new mechanisms and signal stability in global climate governance.

Vulnerable Constituencies: MSMEs and Smallholder Farmers

Exposure to Climate Risks

India's 65 million MSMEs (employing over 150 million people) and smallholder farmers (85% of the farming community) are highly vulnerable to climate impacts, facing declining yields, water stress, and limited adaptive capacity.

Innovation and Finance Gaps

These groups lack access to R&D and climate finance, which is currently channeled mainly toward renewables and EVs. There is a need for targeted R&D collaboration and dedicated finance mechanisms to support technology adoption and resilience.

Social Stability

Failure to address their needs risks not only economic setbacks but also social unrest, given their central role in India's economy and society.

Challenges and Future Directions

Challenge	Description
Land and Water Constraints	The main bottlenecks for clean energy expansion are land and water access rather than finance. Nationwide assessments show the technical potential for over 7 million MW of clean energy, but practical deployment depends on resolving these constraints.
Subnational Action and Resilience	States are developing heat action plans and water strategies, but more work is needed to address urban vulnerabilities and long-term resilience.
Need for Institutional Coherence	India's climate policies are numerous but lack integration into a unified national strategy. Developing a "country platform" similar to Brazil's could help coordinate finance, policy, and international credibility.

India's climate and energy transition is marked by rapid progress, pragmatic policymaking, and growing ambition. The country is laying the groundwork for a resilient, distributed, and efficient energy system, while also expanding its industrial and transport sectors in a low-carbon direction. However, institutional coherence, targeted support for vulnerable groups, and integrated finance mechanisms remain critical challenges. With global climate politics in flux, India is well-positioned to lead by example, provided it can unify its domestic actions into a cohesive national and international strategy.

U.S. State of Play

The U.S. clean energy landscape has undergone a sharp reversal since the Trump administration's return. Key provisions of the Inflation Reduction Act face repeal, long-standing regulations have been rolled back, agencies have been hollowed out, and critical data has been erased—developments that may require a revision of U.S. emissions reduction projections. This federal backsliding has created deep uncertainty for the private sector and left subnational actors to carry forward climate ambition.

Anti-climate rhetoric is strong, with moves to eliminate programs like Energy Star and attacks on DEI and university innovation. The role of money in politics, generational attitudes, and the challenge of communicating the reasons for change are all critical factors. There is a growing acceptance of scenarios where global warming exceeds 3°C, with concerns about the viability of private insurance and the stability of geopolitics.

Shifting Federal and State Dynamics

1 Federal Uncertainty

Federal action is unpredictable and often misaligned with clean energy goals, with Congress struggling to reconcile budgets and quantify impacts.

2 State Leadership

Despite federal rollbacks, states continue to advance climate action with nearly half of US states setting climate or clean energy goals.

3 Policy Innovation

States like Vermont and New York have passed climate superfund laws; Hawaii has declared a climate emergency.

4 Subnational Innovation

Subnational actors (states, cities, ports) are innovating in areas like grid efficiency, cooling, industrial efficiency, and urban transportation.

5 Federal-State Tensions

Congress is considering overturning California's authority, signaling increased attacks on state autonomy.

> It is noteworthy that subnational leadership cannot fully compensate for federal retreat, especially as state authority comes under threat.

Private Sector Resilience Amid Policy Uncertainty

Major support for clean energy in the US has also come primarily through tax benefits to private companies, leading to significant private sector investment, especially in Republican districts. The resulting job creation and capital inflow have made it politically challenging for the current administration to repeal these laws, as most investments remain intact despite some withdrawals (of the $450B, only about $8B has been rescinded). This investment resilience spans across various technologies and sectors.

$450B

Total Investment

Total clean energy investment through tax benefits to private companies

$8B

Rescinded

Amount withdrawn from clean energy investments

93%

Future Growth

Projected percentage of future US generation growth from wind, solar, and storage according to DOE

Private Sector Momentum

- Private sector investment remains strong, with companies maintaining low-carbon portfolios despite reduced public rhetoric.
- Tech sector load growth is driven by multiple factors, including AI and electrification, and companies are seeking rapid access to clean power.
- Permitting reform is seen as a key to enabling clean energy to outperform fossil fuels.

International Perspective

- There is some debate whether climate's demotion from high politics will embolden obstruction or open space for quiet progress and innovation.
- Focus on innovation, grid management, and supply chain security can continue under less politicized banners.

The US clean energy sector is experiencing both significant headwinds and resilience, with state-level actions and private investment counterbalancing federal rollbacks. The current administration's policies have created uncertainty, but have not fundamentally altered the private sector or global momentum. The next four years are expected to be challenging, but there is cautious optimism for renewed progress beyond that period. Engagement with India and other partners, innovation, and subnational leadership will be critical for sustaining clean energy and climate action.

Breakthrough Technologies

The breakthrough technology landscape is increasingly shaped by political uncertainty, shifting industrial priorities, and uneven public-private coordination. The Indian government is moving to liberalize its nuclear energy sector, signaling intent to amend liability laws and welcome private and foreign investment, opening new opportunities for U.S.-India collaboration.

Nuclear Paradigm Shift

In nuclear, the paradigm is shifting from economies of scale to economies of multiples. Major Indian conglomerates, especially in hard-to-abate sectors like steel and cement, are eager to deploy captive nuclear plants on their premises to secure reliable, decarbonized energy, bypassing grid limitations.

SMR Development

Small modular reactors and microreactors are being developed for distributed use cases, such as powering AI data centers or industrial clusters.

Collaboration Models

Holtec's Small Modular Reactor (SMR) model has received approval, with two Indian firms identified for collaboration. There is simultaneous encouragement for the development of indigenous Indian reactor designs.

Regulatory Evolution

The government is actively working to expand the ecosystem beyond the Department of Atomic Energy (DAE), involving multiple agencies to drive privatization and innovation.

U.S. Nuclear Innovation

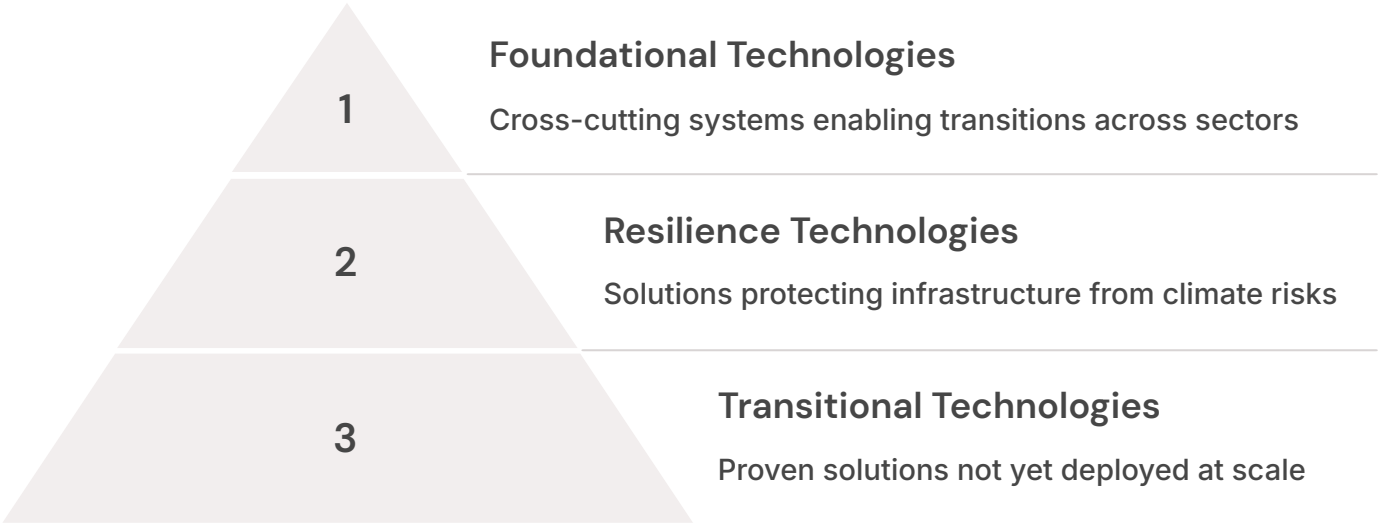
Nuclear energy has become a rare bipartisan issue where Democrats value its climate benefits, Republicans its energy security. Legislative milestones since 2017 (e.g., NEMA, MICA) aimed to streamline licensing and encourage new nuclear technologies. However, current shifts in political priorities have led to concerns about underinvestment in public R&D and the need for stronger federal policy to support commercialization.

Inclusion Challenge

A large portion of India's population lives in rural areas and relies on agriculture as a primary livelihood. At the same time, SMEs contribute 40% of the country's industrial value. A constraint remains as both SMEs and rural sectors are often excluded from mainstream discussions on breakthrough technologies. A more inclusive approach is needed to ensure technological innovation benefits these critical segments of the economy through solutions that are affordable, scalable, and capable of generating goodwill and sustained momentum.

India's Innovation Strategy

India's innovation strategy can focus on three broad categories of technologies to enable a meaningful transition:



Technology Categories in Detail

1. Transitional Technologies

It refers to solutions that are already proven but not yet deployed at scale. For instance, five years ago, solar technology was not ready for mass deployment until market conditions evolved. India cannot afford to use its limited public sector finances to compete with the scale of Chinese subsidies—this is not a fight India can win. Subsidising domestic production of mature technologies is not a sustainable strategy. Instead, the focus must shift to next-generation solutions: What comes after the current solar panel? Is the answer a new model of economies of scale, or deeper bilateral collaboration—perhaps with countries like Japan?

2. Resilience technologies

This includes improved predictive modelling of climate risks, hyperlocal climate assessments, and mechanisms to protect high-capex infrastructure from increasing climate shocks. India is currently investing in infrastructure that may not survive the climate risks it is exposed to. Additionally, with the decline in access to global remote sensing data, particularly from traditional partners, India must build its own capabilities in climate intelligence.

3. Foundational technologies

These are cross-cutting systems that enable transitions across sectors. Critical minerals are a key example. While there is some investment in this space, much remains underexplored and underfunded. India's case today stands in contrast to the earlier U.S. model—here, the private sector is willing to apply solutions, but there is a lack of focused public investment in R&D to drive innovation at the front end.

Key Takeaways:

1

Identify and co-develop nuclear supply chain components for mutual benefit. India's cost advantages in manufacturing could supply global nuclear projects, especially with technology transfer anxieties favoring local solutions.

2

Explore collaborative opportunities in battery innovation, material science, and resilience tech. India has the potential to lead in application-based solutions for battery aging and reuse. EU leads in second-life battery research; India could benefit from collaboration with the US, UK, and EU. Policy direction is needed from multiple ministries to spur innovation and application-based manufacturing.

3

India's innovation environment, less distorted by legacy subsidies, can serve as a testbed for technologies that may later be adopted in the US. Resilience tech and geoengineering are areas of curiosity and potential growth. There is also a pressing need for innovation in battery storage, particularly non-lithium options, to support both grid and off-grid applications.

4

For innovation missions for hydrogen, steel, project delivery and deployment lag behind. Without robust public support and clear planning frameworks, private sector enthusiasm will remain disconnected from national goals.

5

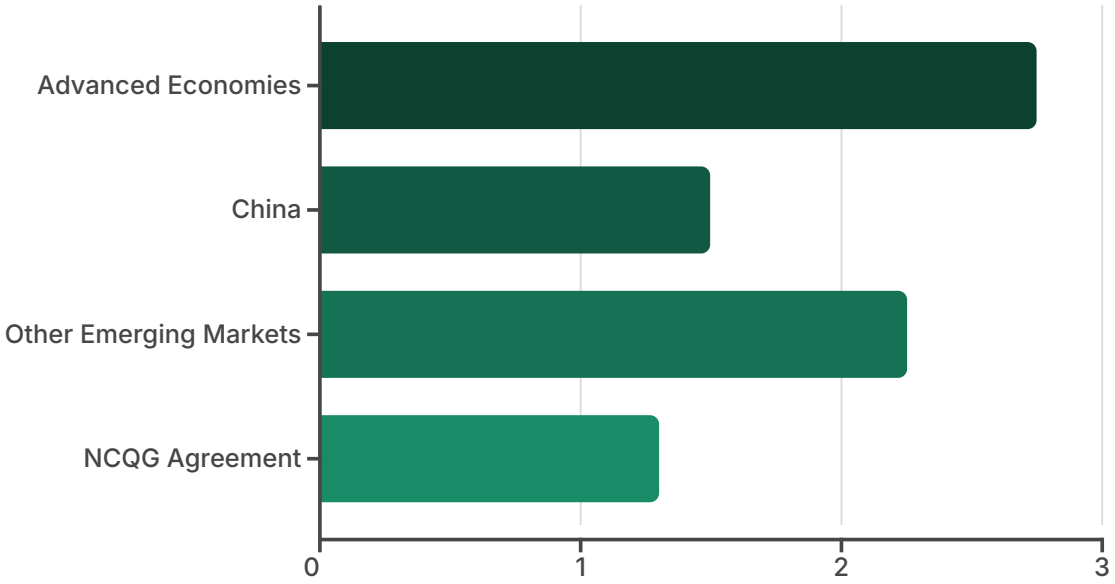
Ensure innovation strategies are inclusive of smaller economies, MSMEs, and underserved communities.

6

Innovations in materials for construction and water absorption polymers for irrigation are also high-impact areas, especially for India's water-stressed agriculture.

Finance and Trade

The current state of clean energy finance is volatile given reductions globally in development finance assistance and the cessation of U.S. international climate finance.



Meeting climate goals by 2030 requires $6–7 trillion: $2.5–3T in advanced economies, $1.5T in China, $2–2.5T in other emerging markets. The NCQG agreed to $1.3T, but there is no clear pathway to achieve this. Much of the previous goal was met through catalyzed private capital, which is now faltering. The US contribution is not insignificant but is small in the context of global needs.

The loss is compounded by the withdrawal of diplomatic and technical support, which had previously encouraged other countries to participate. The threat of shifting alliances have prompted other developed countries to reallocate foreign development assistance – including clean energy finance – to defense.

Investment Barriers

- The barriers to capital flow include tariffs, litigation, and IP issues.
- Many policies that hinder investment are at the state level in India; reducing regulatory burdens and compliance requirements is critical.
- Subnational investment interest is high, but mechanisms to facilitate this are lacking.

MDB Role

- MDBs, especially the World Bank, are indispensable for meeting global finance goals.
- Unlocking capital will require MDB reform, including leveraging funds more effectively and supporting state-level reforms, particularly in electricity grids.
- The focus on derisking has not eliminated risk; it has only shifted it. MDBs were meant to take on risk, but domestic policy environments and risk assessment methods remain major challenges.

Other Takeaways:

- India's insurance sector is rigid, posing challenges for climate risk coverage. As insurance companies increasingly retreat from climate impacted regions, people are left financially vulnerable as extreme weather events and other impacts become increasingly common. India and the U.S. should further examine how to incentivize the insurance industry. There is potential for India-US collaboration on innovative insurance solutions such as parametric insurance.

- Current credit rating systems reward fossil fuel revenue and penalize renewables, which is counterproductive for climate goals. There is a disconnect between financial risk assessment and insurance risk, highlighting a need for integrated approaches.

- Venture capital for new energy has dropped significantly, except for growth in batteries and storage. Green banks are numerous in India (about 600), investing in small businesses in agriculture; the US has fewer but significant green bank activity, presenting opportunities for bilateral learning.

- India has launched a carbon credit trading system, though it excludes power and steel for now. Its effectiveness will depend on allowance calibration and pricing, with the potential to evolve into a carbon tax. As India decarbonizes, fuel tax revenues (2–3% of GDP) will fall, raising fiscal challenges.

- There is a clearer need than ever for increased private sector investment to keep the clean energy transition moving forward. Private capital is meant to make up half of the NCQG. Venture capital flows have been in decline, and that there is a need to think more broadly about the financial tools available, including emissions trading schemes and green banks, in order to leverage all available resources to close the funding gap.

- Financial tools beyond grants and loans, such as emissions trading schemes and green banks, have the potential to increase climate finance in a resource-constrained global environment. The U.S. and India can share best practices and jointly leverage these tools, including through the U.S. DFC, to support clean energy development and deployment, including critical mineral mining and processing and battery manufacturing, in both countries.

- As many countries are skeptical of US leadership and are looking elsewhere for climate finance and policy direction, there is space to encourage subnational and trilateral cooperation, including with third countries and MDBs.

Heat and Cooling Resilience

India is among the most heat-exposed countries, with extreme heat rising in intensity, frequency, and duration. More than 23 heat-prone states are implementing heat action plans, although many are aspirational rather than enforceable.

Integration Challenge

Adaptation and mitigation efforts remain bifurcated, though they are two sides of the same coin; integrating these is a key next step. Challenges remain around the lack of a clear regulator or mandate for heat governance and coordination among various ministries and agencies.

Planning Gaps

Short-term emergency focus, not long-term systemic planning. Building codes, planning tools, and passive cooling tech are underused.

Data Limitations

Undercounting of heat-related deaths; more hyperlocal, real-time data is needed.

Institutional Weakness

Weak institutional capacity at local levels, especially in rural and informal sectors.

Assessment Gaps

India has mapped heat risk across all 734 districts using 35 indicators, but 95% of HAPs still lack detailed vulnerability assessments, making targeted action and resource allocation difficult.

Financing Shortfalls

Lack of financing mechanisms for long-term solutions. Limited insurance, few accessible loans, minimal VC for rural and MSME spaces. New insurance products (e.g., livestock, parametric insurance) and climate modeling are being explored, but scalable financial solutions present a gap.

U.S. Heat Resilience Challenges

In the United States, heat is an escalating but federally under-addressed threat, resulting in heat resilience falling to state and local governments:

1

Federal Capacity Constraints

Threats to FEMA and NOAA's capacity are growing, even as disasters increase. Response capacity is strained by fragmented federal programs (125+) with siloed funding and a bureaucratic burden (95% of time spent on paperwork vs. implementation).

2

Implementation Challenges

Staff attrition, slow fund distribution (e.g., Western NC communities in debt despite federal approval), and local overload are also worsening institutional dysfunction.

3

Reactive Spending

Post-disaster spending far exceeds pre-disaster infrastructure investment. Resilience efforts are becoming increasingly politicized, threatening bipartisan support.

> Cooling is emerging as both a critical mitigation and adaptation priority—yet it remains a global blind spot. Refrigerants, identified as super-pollutants with a disproportionate short-term climate impact, present a high-leverage opportunity to reduce temperature rise over the next two to three decades. There is a need to move beyond purely market-based approaches. Cooling can serve as a strategic entry point into broader energy discussions, intersecting with occupational health, agricultural productivity, grid reliability, and public health and labor standards.

Heat Resilience Innovations and Opportunities

Several key innovations and opportunities were identified such as:

- For India, the challenge is twofold: supporting innovation in non-electric cooling solutions for the informal sector and below-poverty-line communities, while aligning broader cooling efforts with energy transition goals.
- AI and data-driven approaches help identify low-cost, scalable solutions and improve early warning systems. The deployment of over 30,000 temperature sensors to support local planning, AI-enabled mapping of exposure and vulnerability, and the use of tools such as livestock insurance, climate modeling, and localized risk assessments to finance adaptation are key examples.
- City-to-city exchanges and subnational collaboration with U.S. states (e.g., CA, North Carolina) are ripe for development. Opportunities for collaboration include establishing a joint R&D on efficient cooling and second-life battery systems, creating an India–U.S. knowledge infrastructure to link actors in both countries (currently siloed), and leverage city-to-city partnerships, sister city exchanges, and global cooling summits (e.g., Delhi).
- Promote development and deployment of affordable, energy-efficient cooling technologies and passive cooling materials. There is strong potential for research collaboration in material science and building-level standards.
- There is an opportunity to restructure Federal programs, potentially reducing the number of programs from 125 to around 30 for better coherence.
- Innovative pilots include wearable technology to warn individuals of heat stress and parametric insurance schemes to support vulnerable populations.
- Ecosystem preservation and moisture recycling programs can aid local moisture balance and reduce heat impacts. India is further exploring weather-resilient seeds, passive cooling technologies, grid upgrades, and crop diversification as part of its climate resilience strategy.
- Expand financial instruments like parametric insurance and explore innovative financing mechanisms.
- While better data alone may not change minds, narrative strategies must be aligned with tangible solutions. There is a need to frame cooling and heat as public health, labor, and economic development issues, not just environmental. This includes enhancing communication strategies to improve public understanding of heat risks and climate change connections. Cultural and behavioural shifts—such as “Cool Biz” practices and air-conditioning efficiency norms—also play a role.

Heat resilience is a critical and growing challenge for both India and the US, requiring coordinated, multi-sectoral, and multi-level responses. While India is a global front-runner in heat resilience planning and innovation, both countries face significant hurdles in implementation, financing, and governance. Collaborative efforts focusing on data, technology, finance, and policy integration can accelerate progress toward protecting vulnerable populations and building climate-resilient communities.

Supply Chains and Critical Minerals

Critical minerals can be viewed through four silos: mining, processing, recovery (recycling), and innovation. Rare earth mining is hampered by lengthy permitting and processing—sometimes taking up to 30 years to operationalize a new mine. The Biden administration undertook extensive mapping of critical mineral supply chains and coordinated across agencies, but some initiatives have since stalled or been deprioritized. The Trump administration has prioritized domestic mining, including deep sea mining, and has sought international engagement through Ukraine and the DRC.

- **India's Mining Sector**

  India's mining sector is underexplored but is opening up through auctioning mineral blocks, regulatory reforms, and the National Critical Minerals Mission.

- **International Sourcing**

  India has also set up Khanij Bidesh India Ltd. (KABIL) to secure overseas mineral supplies and launched state-level exploration licenses.

- **Solar Investment**

  India has become the largest recipient of U.S. International Development Finance Corporation (DFC) support for solar, signaling global investor interest.

- **Shared Vulnerabilities**

  Both countries face similar vulnerabilities due to limited domestic processing capacity and heavy reliance on imports, coupled with China's export controls on minerals like graphite and germanium.

Supply Chain Diversification

Simultaneously, companies are diversifying away from China due to labor costs and political risk; India is attracting supply chains in solar, batteries, and electronics. India views itself as a potential "India-plus-many" hub, avoiding dependency on "China-plus-one" structures.

Shifting supply chains is complex and slow, with significant resistance and secondary effects from trade agreements and tariffs. India has seen partial success in domestic solar module production and is increasingly attracting major manufacturers like Apple, Google, and Samsung as it scales up local manufacturing. In EVs and batteries, India faces tariff hurdles and national security screening. Companies like BYD have been blocked, while Japanese and Korean firms (Honda, Hyundai, Mitsubishi) are investing in India as a low-cost hub. High tariffs and delays in free trade agreements continue to pose challenges, such as the 15% tariff on U.S. battery imports, which may deter investment in India's electric vehicle sector.

⚠ Furthermore, tariffs and "most favored nation" (MFN) rules are being replaced by country-specific terms, which may create chaotic and unequal investment conditions. While global free trade agreements may be breaking down, bilateral trade expectations (e.g., U.S.-India) still drive planning. European countries are pressuring India to adopt climate-aligned trade clauses, matching U.S. expectations. Scandinavians and Australians are increasingly looking to India for green minerals and manufacturing partners.

U.S.-India Collaboration Opportunities

Emerging opportunities for U.S.-India collaborations include offshore wind, electrolyzers, and batteries, where India is actively pursuing American technology and investment. There is a growing push to use the Quad as a platform for critical minerals coordination. Australia brings mining expertise; Japan contributes technical know-how; and the U.S. and India seek to scale up their ecosystems. The idea is to reroute the benefits of a weakened IRA into Quad-aligned supply chains. The U.S. administration is considering rechanneling funds and policy tools through the Quad to avoid congressional deadlock and to secure more predictable supply chains.

Recycling and Circularity

In India, there is potential for collaboration with the U.S. on recovery and circularity, particularly as India seeks to leapfrog stages of the traditional supply chain. The U.S. has focused attention on mineral recovery, recycling, and sustainability.

Governance Frameworks

There exists an urgent need for the U.S.-India collaboration to develop governance frameworks, possibly under IEA or QUAD auspices. The U.S. is unlikely to rejoin international governance bodies like the International Seabed Authority, further complicating deep sea mining governance.

Key Takeaways:

1. Strengthen U.S.-India Collaboration on Technology and Investment in areas like offshore wind, batteries, and electrolyzers
2. Develop Governance for Deep Sea Mining and advance U.S.-India collaboration on deep sea mining governance under multilateral frameworks like the IEA or Quad
3. Redirect Incentives Through the Quad Framework and reallocate IRA-like incentives toward Quad-aligned projects. Additionally, focus QUAD cooperation on a core set of priorities, such as critical minerals, to avoid agenda sprawl and ensure actionable outcomes.
4. Accelerate Permitting and Policy Certainty in the U.S. and address mining bottlenecks and stalled initiatives.
5. Reduce Dependency on China in Clean Tech Supply Chains and support India's efforts to become a manufacturing hub and diversify inputs.

Subnational Action

U.S.-India collaboration on subnational action is increasingly vital. States on both sides are experimenting with new models for insurance, grid resilience, and cooling standards. There is a growing appetite for knowledge exchange platforms, including a proposed India-U.S. coalition of clean energy-forward states.

In India, action is accelerating at the state level and aligning with national development priorities.

- 24 of 28 Indian states are actively engaged in resiliency efforts, from soil regeneration to distributed renewables, often without using "emissions reduction" language but functionally aligned with climate goals.
- States compete to attract green investment, with Gujarat, Tamil Nadu, and Maharashtra emerging as key industrial hubs, while Assam draws MSMEs in agriculture and Maharashtra/Odisha advance urban carbon transition efforts.
- Major barriers include lack of proven decarbonization technologies in agriculture and urban infrastructure, limited finance access for smallholders, and investor hesitancy in North and East India due to perceived risks.
- Local innovations are bridging gaps: Pune leverages private capital to unlock public green funding, while coal-dependent Jharkhand pursues small-scale decarbonization despite limited private capital.

In the United States, subnational leadership is increasingly driving climate and energy action amid stalled federal policy.

- The U.S. Department of Energy projects 93% of new electricity capacity will come from wind, solar, and storage, driven by AI data center demands, state clean energy policies, and supply chain decisions.
- Fossil fuel providers like GE will not fulfill new orders until 2031, while renewable demand rises. Texas plans $5B in transmission investment to decarbonize oil-producing regions.
- Permitting backlogs hamper renewable deployment, but states like California, Texas, and others in the Midwest and Mountain West are streamlining processes.
- The clean energy transition is embedded in market dynamics, making federal reversal unlikely despite political rhetoric targeting state climate policies as unconstitutional.

Key Takeaways and Future Directions

Financing Innovations

Necessary financing innovations include leveraging insurance markets, pension funds, and other locally managed instruments to support resilience, and exploring new forms of state-level financing disconnected from central government bottlenecks. Private capital and philanthropy are promising vehicles for scale.

Bilateral Collaboration

Expand India-US collaboration on technology, resilience, and market-based solutions, including through philanthropic and subnational networks.

Policy Framing

Strategic policy framing plays a pivotal role in enabling advancement. Clean energy must be linked to jobs, health, energy access, and equity. As seen with the IRA, policies framed solely as "clean" are less politically resilient, and economic co-benefits are key.

State Empowerment

States must be empowered to handle data collection and reporting, especially in India where service delivery faces capacity bottlenecks. The potential exists for Indian states to craft climate-forward legislation, but structural support will be necessary to bridge resource and capacity gaps.

Global Engagement

The U.S. absence from forums like COP is seen as a loss; state voices may need to fill the gap. Trusted partnership frameworks, especially on supply chains and insurance, can still advance via legislative and state-level diplomacy.

> Despite federal policy shifts in the United States and ongoing implementation challenges in both countries, the India-U.S. energy partnership continues to present significant opportunities for collaboration, innovation, and mutual benefit. By focusing on subnational action, private sector engagement, and targeted technology cooperation, both nations can advance their climate and energy goals while strengthening bilateral ties.

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