T20 Policy Brief

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Task Force 02

SUSTAINABLE CLIMATE ACTION AND INCLUSIVE JUST ENERGY TRANSITIONS

Balancing a Trifecta of Economic Development, Environmental Sustainability, and Social Inclusivity: A Policy Framework for Low-Impact Siting to Facilitate India's Sustainable Energy Transition

Joseph M Kiesecker, Lead Scientist, The Nature Conservancy- Global Protect Oceans, Lands and Waters (United States of America)

Nupur Bapuly, Policy Analyst, Nature Conservancy India Solutions Pvt. Ltd., an affiliate of The Nature Conservancy (India)

Shivaprakash KN, Senior Applied Scientist, Nature Conservancy India Solutions Pvt. Ltd., an affiliate of The Nature Conservancy (India)

Kei Sochi, Spatial Scientist, The Nature Conservancy- Global Protect Oceans, Lands and Waters (United States of America)

Anthony Ortiz, Principal Research Scientist Manager, Microsoft AI for Good Research Lab (United States of America)

Juan Lavista Ferres, Corporate VP, Chief Data Scientist and Lab Director, Microsoft AI for Good Research Lab (United States of America)

Caleb Robinson, Principal Research Scientist, Microsoft AI for Good Research Lab (United States of America)

James Oakleaf, The Nature Conservancy- Global Protect Oceans, Lands and Waters (United States of America)

Aishwarya Bhattacharjee, Social Values Mapping Postdoctoral Fellow, The Nature Conservancy- Global Protect Oceans, Lands and Waters (United States of America)

Anand Madhav Mishra, Project Coordinator, Nature Conservancy India Solutions Pvt. Ltd., an affiliate of The Nature Conservancy (India)

Vishnu Pandey, Outreach Manager, Nature Conservancy India Solutions Pvt. Ltd., an affiliate of The Nature Conservancy (India)

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Abstract

The global imperative to combat climate change is driving the global Renewable energy (RE) transition. RE transition has become a critical strategy to reduce greenhouse gas emissions (GHGs) and meet global energy demand. However, the large land footprint required to build this new energy infrastructure could have significant impacts on both people and biodiversity, potentially leading to conflicts that jeopardize investments and hinder the pace of the clean energy transition. Nowhere is this conflict more apparent than in India, where RE targets are ambitious (500GW by 2030) and land use conflicts are already significant.

This policy brief explores the intersection of responsible land use planning and RE development, highlighting its significance within the G20 agenda. It presents policy recommendations to address land conflicts and promote swift RE deployment, advocating for planning strategies that optimize land use while minimizing environmental impact and promoting equitable energy transitions. Additionally, it suggests developing tools to enhance access to data for planning low impact RE siting.

The highlights include the utilization of degraded and converted lands, such as former mining sites and existing built infrastructure, for RE development. Furthermore, the brief suggests adapting financial mechanisms and policies to promote RE away from natural, socio-ecologically sensitive, and productive agricultural land parcels. Ultimately, successful implementation of the recommended policies within the G20 framework holds the potential to ensure a sustainable RE transition that is both environmentally responsible and socially inclusive.

Keywords: Climate Change, Renewable Energy, Just Transition, Repurposing Mine Lands, Sustainable Land Use Planning, Social Inclusivity, Low-Conflict Land Parcels

Diagnosis of the Issue

Urgency and the critical need for rapid deployment of RE in India

To limit global warming to 1.5°C (McCarthy, 2007, 976), a 50% reduction in GHG emissions by 2030 and achieving net zero emissions by 2050 are crucial. With 73% of global emissions from energy use, a swift transition to clean and RE is essential to meet international climate and biodiversity goals. Indeed, RE production must increase nine-fold globally to meet the targets set by the Paris Climate Agreement (PCA) for 2030 (Mordo et al. 2019).

India, one of the top emitters of CO2 globally, seeks to achieve a non-fossil energy capacity of 500GW, with solar and onshore wind projects comprising approximately 80% (420GW) of this target. This initiative is anticipated to reduce India's emissions by about 1 Gt of CO2 and decrease the carbon intensity by less than 45% by 2030. Additionally, India targets 90% of its energy to be sourced from RE by 2047. Estimates indicate that electricity demand could surge nearly fivefold, from 1300 TWh/yr to over 6600 TWh/yr by 2050, necessitating a significant scale-up of RE deployment to 50 GW/year through 2030, escalating to approximately 100 GW/year between 2030 and 2050.

Further, various studies show that net zero by 2070 requires solar and wind capacities of ~4000 to 5000 GW by 2050 and ~5500 to 7400 GW by 2070 respectively (CEEW, 2021).

India's imperative to achieve universal electricity access underscores the urgency of accelerating RE deployment. Despite reporting 99.4% electrification, about 304 million individuals remain without access to electricity, as outlined in the Niti Aayog’s draft National Energy Policy. Ensuring an equitable energy transition is essential, with a focus

on enhancing energy access, addressing energy poverty, and facilitating a just transition for communities.

Emerging land conflicts and RE development in India

While RE is widely acknowledged for its pivotal role in reducing emissions to combat climate change, challenges persist due to conflicts over land access for expanding RE capacity (Kiesecker et al. 2019). This issue is particularly acute in India, where ambitious RE targets clash with significant land use conflicts (Ghosh, 2002; Kiesecker, 2023). As India advances toward sustainability, the rapid deployment of RE is essential to meet escalating energy demands while addressing climate change. Despite setting ambitious RE goals, land availability remains a major obstacle to their achievement. RE sources like Solar and wind energy, being land-intensive, require 10 to 15 times more land per unit of energy than conventional sources. It is estimated that India needs approximately 15,000 to 25,000 km2 of land to achieve a 500 GW renewables target by 2030 (Figure 1), and over 99,000 km2 to achieve net zero by 2070 (over 2.5 to 3% of India's land surface) (Kristoff, 2021; Kiesecker, 2023).

An examination of renewable siting using models based on artificial intelligence in India suggests that existing solar and wind energy projects have been built primarily on productive agricultural lands (~68% for solar and ~22% for wind), followed by biodiversity-rich ecosystems (~7% for solar and ~5% for wind), highlighting the potential adverse land use impacts and associated socio-ecological risks posed by RE expansion in the country **(Figure 1)** (Ortiz et al., 2022). Balancing RE deployment with conservation and social equity demands a nuanced approach. Proactive measures to identify and allocate land for RE development are crucial for a sustainable transition while minimizing adverse impacts.

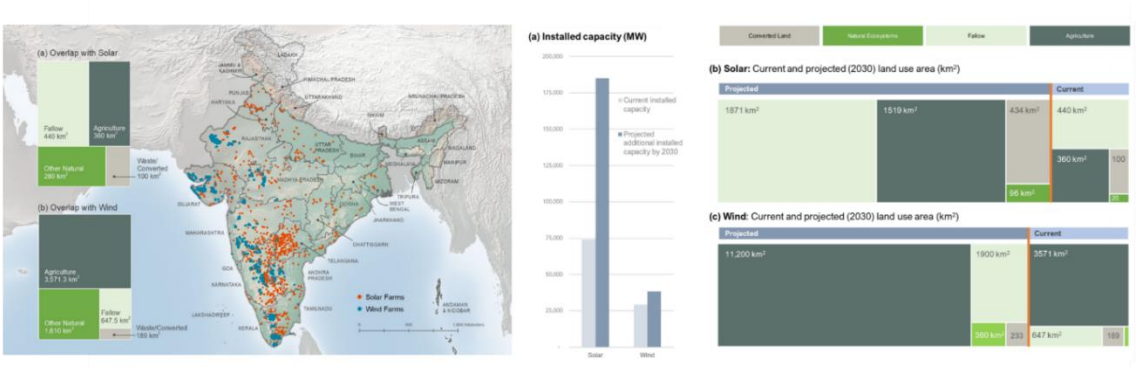

FIGURE 1**:** Map showing land use pattern of RE in India and current and estimated future (2030) (a) installed capacity and overlap with different land types by (b) solar and (c) wind energy projects in India (Kiesecker et al. 2023).

Relevance for the G20 Agenda and Priorities

Given the G20's representation of over 65% of the global population and its substantial contribution of 84% to the global economy, the imperative for member countries to address climate change becomes undeniable. These countries collectively account for a staggering 79% of global carbon emissions, underscoring their pivotal role in mitigating climate impacts (Hutt et al., 2022). Furthermore, the 2023 G20 India leaders' declaration on "Implementing Clean, Sustainable, Just, Affordable & Inclusive Energy Transitions" notably prioritized energy efficiency, security, affordability, low-cost financing for energy transition, energy access, and diversifying the energy portfolio with green hydrogen and biofuels. The declaration also underscored the importance of tripling RE targets globally and ensuring a sustainable energy supply chain, including critical minerals for energy transition.

Additionally, the Declaration emphasized "Conserving, Protecting, Sustainably Using and Restoring Ecosystems," with commitments such as the full and effective implementation of the Kunming-Montreal Global Biodiversity Framework (GBF) to halt

and reverse biodiversity loss by 2030. It also supported the G20 ambition to reduce land degradation by 50% by 2040 voluntarily, as committed under the G20 Global Land Initiative (GLI).

Thus, promoting clean, sustainable, and inclusive energy transition has been a critical strategy of the G20 agenda to combat climate change. Aligning with G20 priorities, we propose policies to mitigate biodiversity and social risks associated with RE expansion, specifically tailored to India's ambitious 2030 targets.

Our recommendations aim to balance energy transition objectives with biodiversity conservation and community interests **(Figure 2)**. India's significant global emission reduction role and the need for locally contextualized policies make it a focal point. However, the applicability of our proposed strategies extends beyond India, offering insights for other G20 countries.

FIGURE 2. Planning and policy pathways that will facilitate the low impact RE siting (Kiesecker et al. 2023)

Policy Recommendations for the G20

1. **Develop standard siting guidelines including identification of preferential go-to areas for RE**: G20 members should prioritize sustainable land-use planning for RE deployment, implementing standard siting guidelines to minimize ecological and social impacts. The Ministry of New and Renewable Energy (MNRE) and the Ministry of Environment, Forest, and Climate Change (MoEFCC) in India are well-positioned to establish guidelines for selecting RE project sites with lower environmental and social impact. This initiative aims to mitigate negative effects on local ecosystems, livelihoods, and community values, ensuring responsible RE development.

State governments can expedite RE project deployment by identifying preferential areas based on resource potential and environmental and social factors **(Figure 3)**, guided by nationally established guidelines. For instance, the EU Commission has directed its member states to accelerate environmental licensing for RE development in designated 'RE acceleration areas'. This approach streamlines project approval processes and addresses land use challenges, which is critical for countries like India and Europe.

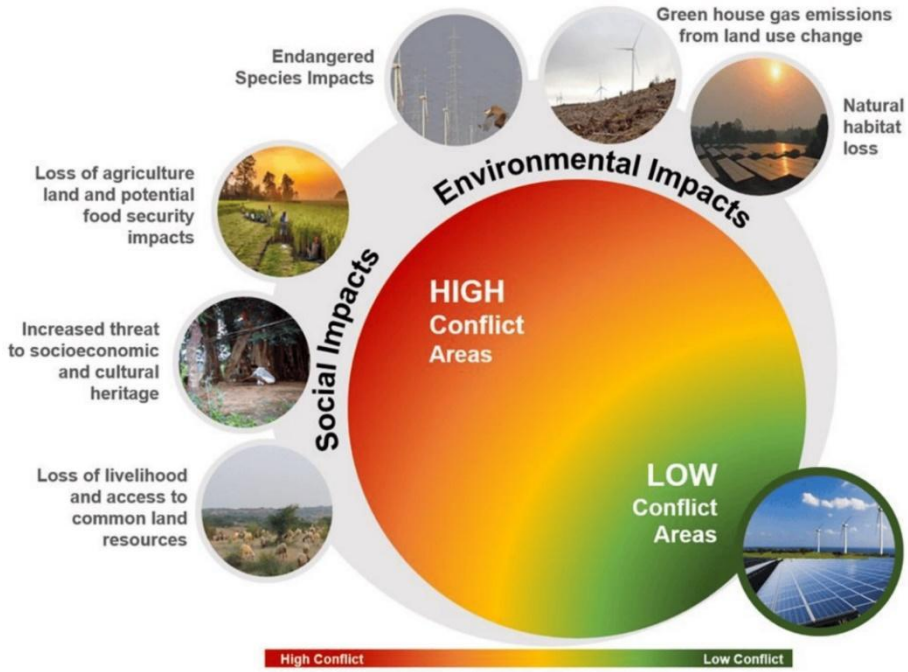

FIGURE 3**:** Defining low-conflict areas—decision makers can map resource potential and critical environmental and social factors to identify areas that are suitable for RE development and less likely to adversely impact those environmental and social values (Kiesecker et al. 2023).

2. **Prioritize degraded and converted land and existing built infrastructure for development**: The G20 should prioritize utilizing degraded and converted land and existing built infrastructure for RE development. India possesses vast tracts of degraded and converted lands with high RE potential, offering an opportunity for solar and wind energy expansion while minimizing conflicts with critical environmental or socio-economic values. A key opportunity lies in repurposing former mining lands for RE development, thus, contributing to energy security and providing economic benefits and jobs to post-mining communities. In India, over 2500 km2 has already been mined for coal and lignite, which can be used for RE repurposing.

Internationally, countries like the USA, Germany, and Australia have successfully repurposed former mine lands for RE development.[1] Furthermore, India also has 11,731 km2 of rooftop area, 300,000 km of canals, 3,25,680 km of national and state highways and 31,553 km2 of reservoirs that can be utilized for solar development.

3. **Adopt policies and financial mechanisms that promote RE development on low-impact land parcels**: G20 members should incentivize significant investment in RE infrastructure, focusing on developing RE projects on low-impact land parcels like former mine lands, degraded and converted lands, and built infrastructure. This could be facilitated through financial incentives, tax breaks, and subsidies to attract private investment and spur innovation in the RE sector (recent Legislative measures such as the

[1] For more details, see, https://www.smh.com.au/business/companies/rio-looks-to-use-old-mines-for-solar-power-20231018-p5edam.html (Accessed on 15 March 2024); https://re100.eng.anu.edu.au/2024/02/28/Researchers-found-37-mine-sites-in-Australia-that-could-be-converted-into-renewable-energy-storage/#:~:text=In%20Australia%2C%20one%20pumped%20hydro,would%20repurpose%20old%20mining%20pits Accessed on 16 March 2024); https://www.dw.com/en/creating-new-life-from-old-and-abandoned-mines/a-64377073#:~:text=From%20Germany%20to%20China%2C%20solar,floating%20solar%20farm%20in%20Germany (Accessed on 20 March 2024).

Inflation Reduction Act of 2022[2] in the United States and the Net-Zero Industry Act[3] in the European Union) signal substantial strides towards achieving ambitious emission reduction targets. Advocacy for national and state-level policies directing RE development on low-impact land parcels with lower biodiversity and social values, such as former mining lands and degraded lands, is essential.

4. **Deploy spatial planning tools to site renewables right**: To actualize energy plans, science-based tools are indispensable, streamlining the deployment of RE on low-conflict lands while ensuring data accessibility and decision-making transparency for all stakeholders. The G20 should prioritize the development and utilization of such tools in energy siting planning. Internationally accessible decision support tools like the Integrated Biodiversity Assessment Tool (IBAT), Avian Sensitivity Tool for Energy Planning (AVISTEP), and SiteRight (**https://www.tncindia.in/what-we-do/siteright/**) facilitate RE project siting (solar and wind) on land parcels with minimal environmental and social conflicts.

[2] According to the act, the USA will invest in domestic energy production and manufacturing and reduce carbon emissions by roughly 40 percent by 2030 amongst other provisions, https://www.congress.gov/117/plaws/publ169/PLAW-117publ169.pdf

[3] This will accelerate progress towards the EU's 2030 climate and energy targets and the transition to climate neutrality, https://ec.europa.eu/commission/presscorner/detail/en/IP_24_585

5. **Incorporation of Socio-economic Considerations:** Emphasize the integration of socio-economic considerations in RE projects, particularly in regions heavily reliant on fossil fuel extraction industries. This includes the provision of retraining programs, job placement assistance, and community development initiatives to support the transition to RE and mitigate adverse socio-economic impacts.

6. **Advocacy for Policy Coherence:** Advocate for policy coherence among G20 members to ensure alignment with global climate objectives, biodiversity, and energy transition commitments, such as those outlined in the Kunming-Montreal Global Biodiversity Framework, Paris Agreement and SDGs to ensure sustainable green transition. This entails harmonizing national policies and regulations to create an enabling environment for RE deployment and emission reduction efforts.

Means of Implementation

1. **Develop Standard Siting Guidelines:**
    - **i.** Establish a task force or working group within the G20 to develop standardized siting guidelines for RE deployment.
    - **ii.** Facilitate knowledge-sharing and capacity-building workshops to disseminate best practices in sustainable land-use planning for RE.
    - **iii.** Encourage collaboration between national governments, environmental agencies, and RE stakeholders to ensure the effective implementation of guidelines.

2. **Prioritize Degraded and Converted Land and Existing Built Infrastructure for Development:**

   i. Establish financial incentives and investment mechanisms to promote the development of RE projects on degraded and converted lands.

   ii. Create public-private partnerships to facilitate the repurposing of former mining lands for RE development.

3. **Adopt Policies and Financial Mechanisms that Promote RE Development on Low Impact Land Parcels:**

   i. Implement national and state-level policies incentivizing RE development on low-impact land parcels.

   ii. Partner with financial institutions to offer favourable loan terms and financing for RE projects on degraded and converted lands.

   iii. Create a monitoring and evaluation framework to assess the efficacy of financial incentives and policy measures in advancing low impact RE development.

4. **Deploy Spatial Planning Tools to Site Renewables Right:**

   i. Offer technical assistance and capacity-building to G20 countries in deploying and using spatial planning tools for RE siting.

   ii. Collaborate with international organizations and research institutions to improve decision support tools for biodiversity and social values assessment.

iii. Promote the integration of spatial planning tools into national and regional energy planning for informed decision-making and conflict reduction in land use.

5. Incorporation of socio-economic considerations:

i. Conduct thorough socio-economic impact assessments for RE projects, particularly in regions reliant on fossil fuel extraction.

ii. Allocate funds and resources for retraining, job placement, and community development to aid the transition to RE.

iii. Facilitate multi-stakeholder dialogue and collaboration to tackle socio-economic challenges and promote inclusive RE development.

6. Advocacy for Policy Coherence:

i. Advocate for policy coherence among G20 members to align national energy policies and regulations with global climate and biodiversity objectives and commitments.

ii. Enhance international cooperation mechanisms like peer reviews and policy dialogues to share best practices in low impact RE policy implementation.

Scenario of Outcomes

- **Standard Siting Guidelines:**

Contradiction: Standard siting guidelines seek to reduce environmental and social impacts, yet conflicts can arise between RE expansion and the preservation of ecologically sensitive areas.

Trade-off: Prioritizing certain areas for RE development may lead to disputes over land use, particularly in regions where economic interests clash with conservation efforts.

- **Priority for Degraded and Converted Land:**

Contradiction: Promoting degraded and converted land use for RE development may spark conflicts over allocation, particularly where competing interests like agriculture or conservation are at play.

Trade-off: Promoting degraded and converted land for RE can offer economic advantages but may also prompt concerns about loss of cultural heritage and resource rights of land or community disruption.

- **Policies and Financial Mechanisms:**

Contradiction: Incentivizing RE infrastructure investment may favour large corporations over smaller and local initiatives, exacerbating funding access disparities.

Trade-off: Providing tax breaks and subsidies to attract private investment may strain public finances and divert resources from other social and environmental priorities.

- **Spatial Planning Tools:**

Contradiction: Such tools, despite aiming to mitigate land use conflicts, may face limitations due to data availability, technological constraints, and diverging stakeholder interests.

Trade-off: Deploying such tools may necessitate substantial investments in capacity-building and infrastructure, potentially drawing resources away from other RE initiatives.

- **Incorporation of Socio-economic Considerations:**

Contradiction: Incorporating socio-economic factors into RE projects may prompt worries about displacing local communities or worsening social inequalities.

Trade-off: Offering retraining programs and job placement aid may demand substantial resources and coordination, possibly diverting focus from other critical socio-economic issues.

- **Advocacy for Policy Coherence:**

Contradiction: Advocating for policy coherence among G20 members may face resistance due to divergent national interests and priorities.

Trade-off: Achieving policy harmonization may necessitate compromise and negotiation, possibly delaying the enactment of effective climate and energy policies.

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