

BHADLA SOLAR PLANT GOVERNANCE MODEL: HARNESSING THE DESERT SUN OF RAJASTHAN THROUGH GREEN FEDERALISM

Nandita Kapoor and Harshit Mathur
Assistant Professor
University Of Delhi

ABSTRACT:

Environmental problems have transcended the borders, and thus ramifications of such tribulations are also felt in other parts of world. In such a scenario, this paper presents how an effective model of cooperative governance, federal arrangement, administrative innovation, and inter- governmental collaboration paved way for establishment of Bhadla Solar Power Plant in Rajasthan. While existing studies primarily see it as a technological miracle making it an epitome of technical invention, this paper dissects the foundational institutional processes involved including centre-state synergistic arrangement, public-private partnerships, shared responsibility, cooperative federalism under the larger ambit of international renewable energy commitments, transnational norms and sustainable government goals. Thus, this paper would explore how intersection of green federalism and living experiment of domestic environmental projects would create a scenario to move away from contestations offered by federal arrangement, and pave solutions for policy-makers, administrators, and students of public administration, governments, having implications at a global level. The case study would include narrative lens of all the stake- holders involved, including the voices of marginalized people to showcase how their problems were confronted while moving towards the path of development.

KEYWORDS:

Green federalism, Collaborative governance, Bhadla Solar Power Plant, Environmental Governance

INTRODUCTION:

Environmental federalism refers to allocation of specific roles to national, state and local units (Oates, 1997) in order to bridge the gap between theory and practicality in order to resolve environmental concerns by optimal distribution of responsibilities. (Shobe and Burtraw, 2012) Multi-level governance with shared ruled and environmental decentralization at various levels of jurisdiction becomes a pre-requisite in order to tackle these issues since these are found to have ripple effects for the entire globe in order to find holistic solutions. (Srivastava & Dutt, 2015) The foundational stone behind the synergistic inter-section of green federalism with environmental governance has to deploy growth and developments keeping in mind Iyer's triad of limits, justice, and harmony wherein ecological restraint remains in order to protect our nature simultaneously keeping in mind the local people who would be adversely affected by the development model, and the former becomes obligation for the state which can be accommodated by collaborative governance. (Iyer, 2007) Thus, inclusive growth shouldn't come at an opportunity cost in terms of injustice for the people who are affected by these policies mechanisms, and at the same time cooperative governance at all levels can ensure equity and sustainability. It is important to note that energy comes in concurrent list which could create frictions between centre and state, and thus only coordination is the way by which the priorities of both levels could be leveraged in harmony.

Under this federal arrangement, came the model of India's largest solar park, the Bhadla Solar Power Plant established on the barren land of Rajasthan is credited as a technological marvel to foster clean energy potential of India. (MNRE, 2023) However, the research would look it in a way which carved a path for cooperative federalism to come in action, despite of institutional and structural predicaments. It becomes pertinent to tackle the problem of over-dependence on fossil fuels, and thus escalate the usage of renewable energy to overcome

energy security risks, infrastructural loopholes, price fluctuations, environmental vulnerabilities. (IEA, 2021) In order for this energy transition, India sets its objective at COP 26 of achieving ‘500 GW of clean energy capacity by 2030’ (PIB, 2021) and thus this model shining with radiant photovoltaic panels, was a reflection of this ambition also in alignment with the Paris Agreement, and International Solar Alliance to attain sustainable solar energy. When we delve into the factors which could make this far-fetched ambition into a reality was not just through accessibility to the best of the technical resources, however, the leading factor for making this endeavor possible was via institutional mechanisms, unprecedented centre-state-local levels collaboration along with capitalist enterprises, administrative mechanisms. Elinor Ostrom (2010) characterizes environmental governance to be ‘fragmented and adversarial due to the complexities emerging because of overlapping responsibilities and jurisdiction, thereby leading to incompatible outcomes. (Ostrom, 2010) On the contrary, Bhadla Solar Power Plant was a project showcasing resilient efforts to showcase mitigation of risks involved via operational federal synergy in contrast to “contested federalism” (Rabe, 2011) where contestations between different levels lead to indecisive outcomes. Within this framework, Bhadla Solar Plant case would not be projected as a seamless victory, but rather as a real-time experiment exhibiting a trajectory of progress and opposition. This case study becomes even more relevant in a scenario where there is ongoing commitment throughout the globe to renewable energy. This would further look into how federal governance could pave pathways for environmental governance via inter-institutional deliberations, regulatory structures, and multi-stakeholder cooperation which would be examined in the subsequent sections to analyze the case study. In order to explore the above aspects, this paper would employ case study approach drawing on qualitative textual analysis of various organizations reports such as that of RRECL, SECI, PIB, World Bank; newspaper coverage on the foresaid topic, and academic literature available on green federalism and these would be further explained in lucid manner via charts, tables, flow charts through author’s compilation of data from these sources. And in order to diversify the case study, it would also employ Kuusisto’s framework in order to understand case study from different stand points with different lens.

ANALYTICAL STUDY OF CASE:

Keeping in mind the context described above, we need to look at various facets of the case study for an in-depth understanding of the same. There were many stake-holders involved in this project, and due to their collective action, the project was made possible. Let us look at each one of them closely:

At the union level, Ministry of New and Renewable Energy (MNRE), formerly was called as the Department of Non-Conventional Energy, which was later elevated to the status of being a ministry to spearhead developmental programs in institutionalizing the space for renewable energy via strengthening of policy frameworks, formulation of capacity building programs, and output augmentation.(MNRE, 2025) Under India’s National Solar Mission as part of the broad plan of National Action Plan on Climate Change, MNRE had been putting in efforts to increase capacity for solar energy (PIB, 2015) and one such remarkable step had been to establish solar power plant. The major functions undertaken by this nodal agency were to ensure fiscal availability through funding, low-interest credit rates, long-term power agreements, which further lead to scalability of the project, mobilized private sector investments and thus fulfill the climate commitments. While MNRE was primarily working as a legislative agency, the task of execution of these projects lied in the hands of Solar Energy Corporation of India. (SECI, 2021) The major functions of this institution were to form a seamless marketing network by allocating competitive tenders, and come up with lucrative prices and agreements with project developers. (CERC, 2020) In case of Bhadla Solar Power Plant, SECI under director manager Anil Kumar, undertook transparent auction mechanisms which enabled participation by various private firms such as ReNew Power, SoftBank, Adnani Green Energy since it was able to bring the tariff to as low as that of power of coal.(CERC, 2020; MNRE, 2023). This is a stark example of Public-Private partnership as both the government agencies with implementation capacity collaborated with private firms and their executives in order to achieve the outcome of climate governance. This model reflected their collaboration:

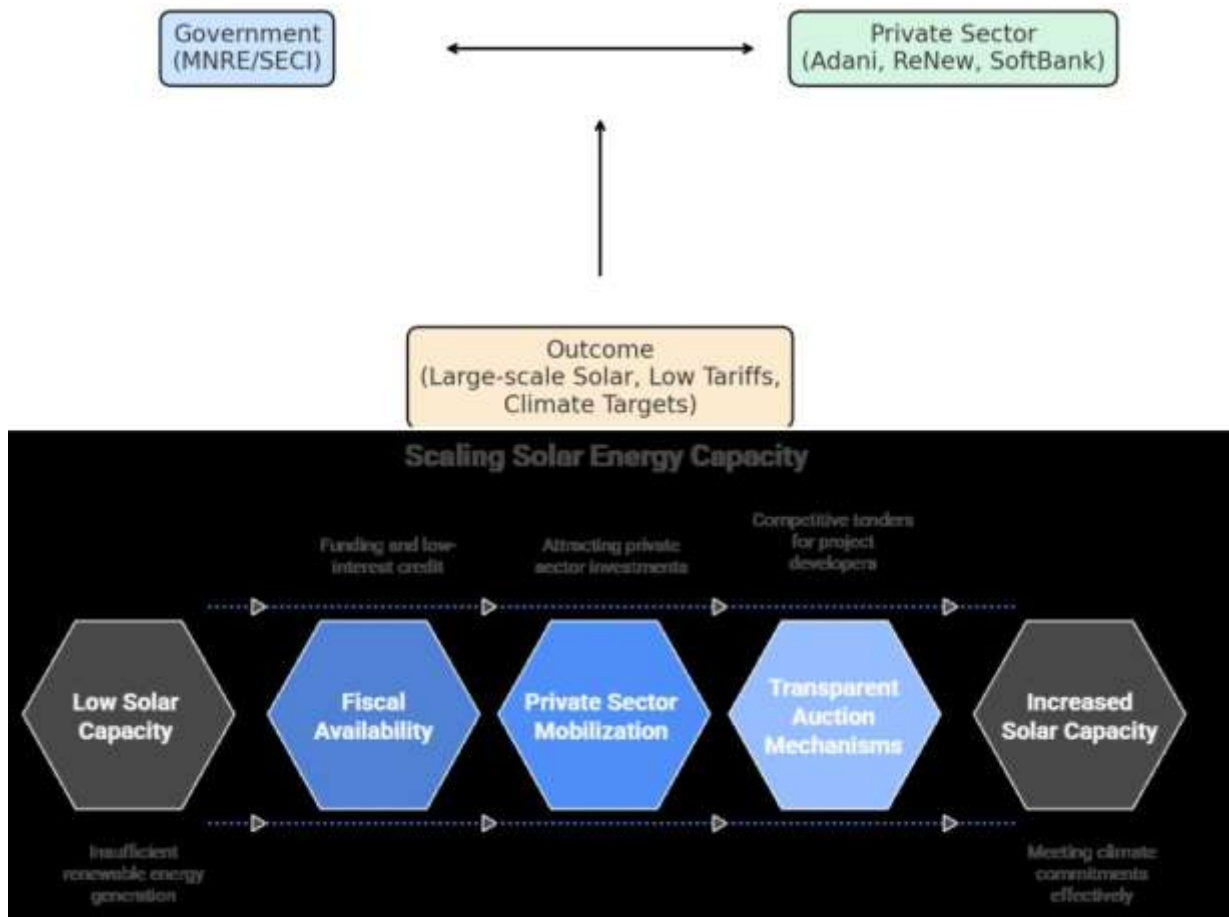


Figure 1: Public-Private Partnership. Author's compilation based on MNRE (2023); SECI (2021); CERC, (2020)

However, the efforts undertaken by the former agencies would have been incomplete without an agency working at the state level and thus ensuring shared rule between centre and state. At the state level, the Rajasthan Renewable Energy Corporation Limited (RRECL) was integration of two organizations that of the Rajasthan Energy Development Agency (REDA) and the Rajasthan State Power Corporation. Its responsibilities encompassed accessibility to resources, coming up with projects followed by enforcing policies through investor's engagement accommodative of the interests of both state and national renewable goals.(RRECL, 2021). In order to operate the project, this agency under the leadership of Ramesh Chaudhary undertook many steps such as that of firstly acquiring the most important natural resource that of land for its installations, however this required prior negotiations with those who had ownership of the land who were essentially the local communities. This challenging negotiation with landowners, while not being oblivious of the state laws and conventions, was done effectively by the agency by responding to their entitlements in order to ensure their security. (MNRE, 2023) Further, it was to be supplemented by infrastructure-building capacities such as ensuring seamless network of transportation by greater connectivity to inter-state transmission grid to national grid, which facilitated collaboration with private investors with reduced vulnerability to get captured by impediments. (CERC, 2020) In addition to fulfilling the former prerequisites while handling political intricacies, multi-level governance of RRECL and SECI further executed the functioning of the project by ensuring regular management, supervision and synchronization with various developers and investors. This clearly indicated how state level agency can amalgamate their own area's priorities with India's broader climate commitments made at global level. This clearly exemplified what Elazar (1987) talks about the concept of 'Bargain Federalism' wherein the broad idea of shared national identity is kept at a priority by reconciliation of the interests of their respective levels involved in such network of joint accord. (Elazar, 1987) In the arena of renewable energy, there is an intersection of jurisdiction and no clear demarcations, and thus harmonization can only pave the way for collective climate governance. (Watts, 1999 and Hueglin & Fenna, 2015) This nexus between centre, state and private investors was clearly indicative of cooperative bargaining, exemplified as below:

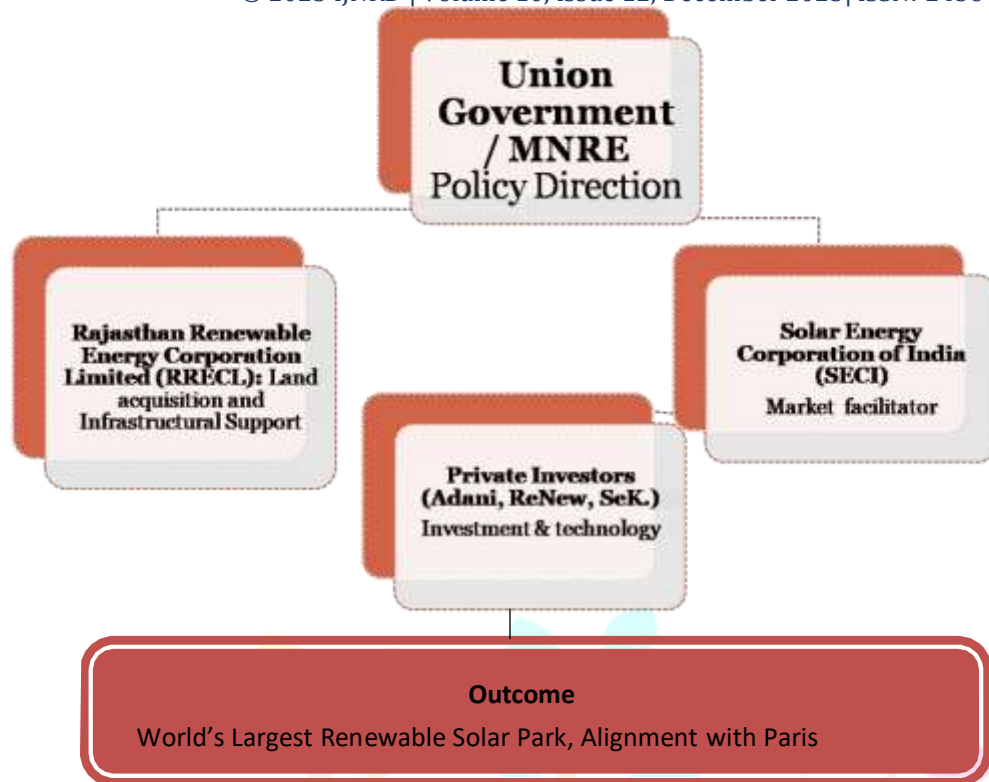


Figure 2: Centre- State- Private Nexus in Bhadla Solar Plant (Author's own compilation based on MNRE, 2023; CERC, 2020)

With SECI providing financial viability, it led to emergence of many new private developers such as Adani Green Energy, ReNew Project, SoftBank Energy. For instance, Adani Green proclaimed to the world's largest solar developer of worth 45,000 crore. (Livemint,2020; Adani Green Energy Ltd., 2023). Apart from this, ReNew also did power contract of around 400 MW (Mercom India, 2020) Development banks also facilitated the completion of the project such as World Bank gave dollar 165 million for scaling up rooftop installations, and thereby expanding the scope of solar power energy, with Asian Development Bank extending support for rooftop network distribution and thus integrating this renewable energy with the entire ambition of meeting with international climate goals (World Bank, 2022; Powerline,2024). This clearly showed how domestic coordination fostered trust in international organizations thus creating an ambit of sustained investor reliance within the framework of federal-private partnership. This is in contrast with adversarial cases of federal arrangement due to the persistent efforts to create synergy between various organizations, creating a dynamic for large scale solar deployment. Together, these organizations formed the institutional backbone of this project, where federalism was not seen as stumbling foundation; rather it highlighted inter-governmental collaboration, institutional support to advance climate goals even in a complex arrangement of Indian Federalism. Collaborative success in this project was made possible because of the role played by these organizations which can be summarized as follows:

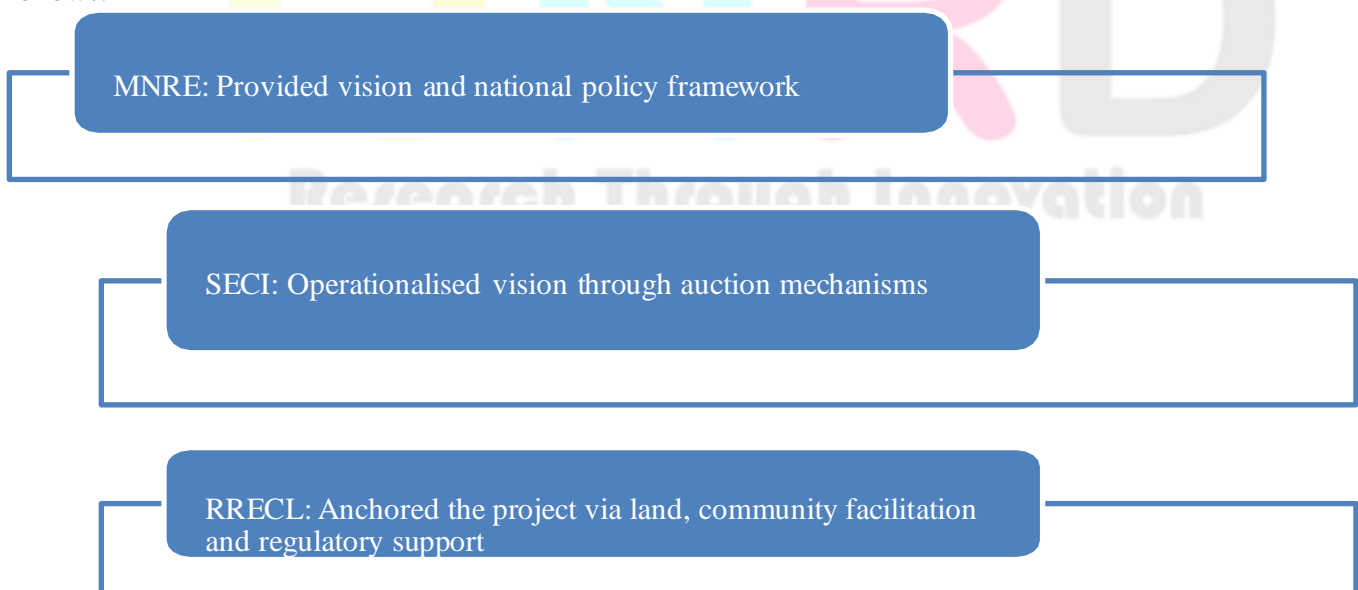


Figure 3: Collaborative Governance model (Author's own compilation based on summarization of the above data)

CHALLENGES:

Despite the coordination and nexus evident in inter-governmental, state and private investors, there were some challenges encountered in such multi-level governance. Initially, MNRE’s targets were seemed to be too grandiose, at a time when international investors didn’t have trust to do financial backing, and private investors were not aiming to be a part of auction mechanism because of low margins.(TERI, 2019) With development, came yet another problem of displacement of local pastoralists communities in order to acquire more land for establishment of such an elaborative project, which could lead to prioritization of capitalists interest over the welfare of those at the margins. (Sharma, 2020) Thus, this challenge had to be met by another layer of negotiations with local stakeholders and community entitlements such as pastoralist grazing rights. This created a dilemma over how to take national and state responsibility in alignment, and not belittle local rights at the same time since national target it to achieve net- zero target in the following years but this comes with an opportunity cost to trade off livelihoods for the marginalized voices. Thus, green federalism is not just about achieving climate targets, but also ensures equity, justice to those who would be affected by such capacity building initiatives. Another tribulation that arises was that of State Distribution companies in Rajasthan which were under financial strain due to less autonomy in financial matters long with lack of financial backing, due to which this transcends pressure on state to carry on with the project within this unstable financial network. Thus, within the scenario of interlocking of so many stakeholders characterized by collaboration and conflicts, the solution lied in finding arenas to negotiate. There were ecological problems evident as well, evident in loss of habitat for Great Indian Bustard and water was being utilized for implementing this project, thus raising environmental concerns for desert eco-system, latter was later countered by water cleansing technologies by private developers. These challenges were strategically resolved by inclusive land acquisition strategies, public-private nexus and equitable distribution framework. (Gupta, 2019) Authorities resolved the problem of local pastoralists by making them a part of this project through provision of employment and capacity development programs, thus leading to livelihood security, socio-economic empowerment through providing them services to operate as technicians, cleaners, and transporting goods at construction sites. (Thomson Reuters Foundation, 2022) Thus, the project showed how large scale deployment of such projects also trickles down its benefits in other ways such as developers introducing mobile health and veterinary services in order to cater to community welfare and align growth with corporate social responsibility. (Thomson Reuters Foundation, 2022) All the concerns of communities were further compensated by regular village meetings and listening to their grievances by one of the community grievance officer Priya Sharma. In addition to this, community awareness programs were conducted to explain benefits of renewable energy and thus not isolating the villagers as stakeholder to become a part of greater aim to expand the deployment of solar energy. Other problems were resolved by coordinated tendering; allocation of specific functions like MNRE responsible for meeting national targets, RRECL managed state level execution, Private developers were catalysts of establishment of such projects and SECI managing the auction periodically and fair market compensation not to lead the investors lose their faith to invest in project along with management of operational efficiency. The tribulations along with their solutions are summarized as below:





Table 1: Stakeholder Concerns and Mitigation Measures undertaken in the Bhadla Solar Plant (based on Author’s compilation of the above data)

PROBLEM	STAKEHOLDER	SOLUTION
Land Acquisition, Loss of livelihood, Loss of entitlement rights over land	Pastoralists and local community	Grievance Redressed, Community Programs, Employment provisions, Human centered engagement, Participatory programs
Public-Private Conflicts	Private Investors, State Distribution Companies	Clear delineation of roles of Union and State agencies, Public-private partnership and agreements
Ecological Problems	Great Indian Bustard, Water as natural resource	No elaborative mechanism for their protection, waterless technology deployed later by developers
Lack of trust by funders	Private developers and investors	SECI facilitated periodic auctions, Equitable market compensation

Let us look at this case study from a narrative framework borrowed from Kuusisto for interpreting this particular model from various lenses such as that of binaries, shared responsibility, visionary growth and peripheral voices.

From the perspective of tragedy, this case could be seen as envisioned by oppositional interest seen in the case of overlapping jurisdiction of centre and state government, disappointment over land acquisitions, inter-governmental misalignments. From the perspective of epic, it focused on policy optimism regarding achievement of climate goals in order to have a transformative effect on energy matters. And from the lens of comedy, it showcases how tragical aspect was overcome by adaptive solutions, Public Private Partnership, policy directions, problem-solving mechanisms, thus generating beneficial outcomes to achieve the lens of epic. Large projects like these can't be entirely devoid of contradictions evident from the perspective of Satire that of local communities concerns over losing their land. This lens revealed what is disguised behind the achievement of national outcome which refers to the lived realities faced by these communities to examine equity and inclusion. However, this was mitigated by incentives and giving them a platform to put forth their suppressed voices. Thus, cooperative federalism and transformative potential of green federalism was assured by shared monitoring systems, policy alignment, and inter-governmental collaboration in execution of the entire project. The entire lens can be understood by the following figure:

Table 2: Narrative Plot of actors involved in the model (Based on Kussito, 2019) framework

PERSPECTIVE	CHARACTERISTICS	EXAMPLES
Tragedy 	Conflicts, Limitations	Centre-state disputes, land acquisition
Comedy 	Solution oriented, Optimistic outcome	Negotiation, PPP coordination, adaptive solutions
Epic 	Goal-oriented Vision, Transformative outcomes	Renewable energy targets, climate leadership
Satire 	Hidden outcomes, Binaries	Social inequalities, trade-offs of welfare for local communities

Thus, this narrative framework is an all inclusive one which showcases how this model could be seen from varied standpoints, and how these were inter-mingled which ultimately lead to optimistic outcome by resolving dissatisfaction.

WAY FORWARD

The Rajasthan case exemplified how justice cannot be relegated to corners while talking about inclusivity and in the path of development, community rights cannot be ignored. This project does showcases strengthen mechanisms for multi-level governance through constant division of roles and dialogues taking place between Centre, State and all stakeholders. However, challenges that were seen were that of financial accountability, ecological protection, and greater inclusivity via stakeholder integration and transparent communication mechanism with local communities. By looking at loopholes from the above section, certain suggestions are as follows:

- Strengthening Federal Mechanisms:

In order to replicate positive outcomes in other states and in other arena of energy, India could institutionalize climate governance through a specific council for green federalism where state, centre, private entities, civil society could together make decisions to ensure dispute resolutions and a decentralized system for accountability towards climate commitments. Also, this council could pave solutions for solar-rich states, wind-rich states and hydro states to implement their projects accordingly by doing cost-benefit analysis. In a collaborative federalism, states cannot be relegated the sphere of just being under the direction of centre, rather they would also need fiscal autonomy in order to implement such larger projects, thus Finance Commission could give special grants in the name of environmental grants to the state.

- Assurance of Fiscal Federalism:

State distribution companies could be handled in a more judicious way for their delayed outcomes and introduce

certain payment mechanisms in order for private developers to foster trust. There could be mechanisms of pooling of tariffs facilitated by SECI or any other organization so that national targets could be met without their dissatisfaction.

- Balance biodiversity with renewable projects:

There should be assessments in order to look into how these projects do pave problems for certain ecological sensitive areas, and thus impacting bio-diversity and eco-systems, and thus these could be declared as prohibited zones for establishment of large-scale renewable projects. Thus, safe zones could be identified in order to save habitat of Great Indian Bustard while separating them from critical habitats. Another ecological problem seen was that of scarcity of water while implementing this project, which could be solved by linking water with renewable energy and thus focusing on integrated federalism. This issue could be resolved by establishment of a tribunal which would look into their linkages and collaborate with other states on solar-water synthesis.

- Increased community engagement:

Another mechanism to foster greater inclusivity was to increase participation of local communities in decision making as well, which could be done by leasing of land rather than acquiring their habitats.

Therefore, this case study shows how federalism is a living model which instead of being rigid has to be adaptive to multi-dimensional challenges. This framework cannot be made in a way which could be uniformly implemented in all states, there has to be modifications specific to the area's tribulations, but one could learn lessons of inclusivity, greater collaboration to meet climate goals, institutional synergy, shared vision of sustainability from Bhadla Solar Power Plant. Thus, this clearly exemplifies how technical innovation, social inclusivity and greater development could be achieved even in case of mega renewable projects, providing lessons for administrators and policy makers to make such projects receptive to all the multi-dimensional challenges by negotiation, inclusivity, redressal mechanisms.

This further probes questions for discussion such as:

- ❖ Should states prioritize national climate commitments even if that impose costs on local communities?
- ❖ Which aspect out of the two, justice or scalability is prioritized? How can India balance its leadership with that of distributive justice at local level?
- ❖ Can institutional mechanism such as council on climate resolve tensions better than schemes and can it look into every aspect of energy in consonance with all states?
- ❖ Whether Renewable energy deployment projects works better in a centralized framework or community driven models?
- ❖ What lessons can be drawn from Rajasthan solar journey for other states and federations in other energy dimensions like that of water and other renewable sources?

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