

## CHAPTER 3

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# How Just and Democratic Is India's Solar Energy Transition?

## An Analysis of State Solar Policies in India

Karnamadakala Rahul Sharma and Parth Bhatia

### Introduction

In our warming world, energy provision is not simply about technology but also politics (Hughes and Lipsky 2013). Energy systems are the result of intensely contested political battles in the domains of technology selection, ownership of capital, environmental externalities, access, and siting. The geographical reach, terms of access, and forms of ownership of electricity infrastructures reflect the prevailing distribution of political and economic power (Bridge, Özkaynak and Turhan 2018). Consequently, this gives rise to injustices such as uneven electricity access, displacement, and voicelessness among marginalized communities. Control over energy infrastructure is not just the result but often also the source of political and social power (Amin 2014; Larkin 2013) – that is, energy shapes politics just as much as politics shape energy.

India is facing the twin imperatives of tackling historic energy poverty through an expansion of its energy system on the one hand and pursuing climate mitigation on the other. India's electricity sector is dominated by coal-fired thermal power, which in turn drives the country's carbon emissions. The energy sector as a whole contributed around 74 per cent of India's total greenhouse gas (GHG) emissions in 2015, of which 38 per cent was from public electricity generation (GPI Secretariat 2016). On the other hand, India's average monthly residential electricity consumption is only

90 kilowatt-hour (kWh), which is one-third of the global average and one-tenth of that of the US (Chunekar and Sreenivas 2019). Despite official estimates of 100 per cent electrification, many households still receive poor quality electricity for only a few hours each day (S. D'Souza 2019). The growing feasibility of renewable energy (RE) indicates a potential opportunity to address both climate mitigation and energy poverty challenges. India announced a target of 450 gigawatt (GW) of RE by 2030 as against a total installed capacity of 370 GW in April 2020 (PMO India 2019). As we progress towards a low-carbon system, what are the implications of this transition, given existing patterns of injustice and the prospects of their reproduction in our twenty-first-century energy infrastructure?

India's electricity system can be characterized by its gigantic scale; the primary state ownership of its generation, transmission, and distribution infrastructure; cross-subsidization from commercial and industrial consumers to agricultural consumers; and its federal nature. Due to the unique technical characteristics of solar photovoltaics (PV) – modularity, intermittency, and fuel-free generation – it offers an opportunity to fundamentally disrupt the political, financial, and institutional arrangements associated with the existing system<sup>1</sup> (Dubash, Swain and Bhatia 2019; Stephens 2019). These potential disruptions include attracting high-paying industrial consumers away from the grid, allowing new players (individuals, co-operatives, high-risk fast capital) to compete for energy ownership, and shifting the federal balance of power as the Centre's monopoly over coal loses salience.

By disrupting the existing equilibrium of power, the rise of renewables offers an opportunity to link energy choices to broader social justice goals and to redistribute power and wealth within societies (Angel 2016; Stephens 2019). Whether the ultimate beneficiary of an RE-based society is the common energy user instead of the elite will be contingent on how new energy infrastructures are specifically structured and will not be simply determined by the choice of technology. It will hinge upon whether the RE-based system incorporates the concerns of the marginalized, compensates the losers of this transition (such as coal workers), shares benefits inclusively, and creates participatory forms of governance. This is where the critical lenses of energy democracy and energy justice gain salience in India.

This chapter explores the extent to which India's state-level solar energy policies embody the goals of a democratic and just energy transition. We first define and

<sup>1</sup> Modularity is a feature of PV technology, which means that the constituent unit is small in scale, but many such modules can be combined to create a system of any size. In contrast, conventional power systems have many sub-components and only become economically feasible at large scales.

contrast energy justice and democracy. Second, we examine how these conceptual lenses have been applied in India and present a framework for analysis. Third, we explain our methodology and then discuss findings from an analysis of key state solar policies. Fourth, we conclude by contextualizing the insights from the energy system by locating it within the broader theme of climate justice and by offering avenues for further research in this field. Before delving further, it is worth highlighting that our chapter focuses primarily on the policy discourse surrounding practices of RE deployment and does not engage directly with the growing literature on the impact of energy transitions on the coal sector. Our focus on RE serves to complement the coal-focused chapter in this volume by Vasudha Chhotray (Chapter 6).

### Understanding energy democracy and energy justice

Energy justice is a conceptual agenda that aims to evaluate 'where injustices emerge, which affected sections of society are ignored and which processes exist for their remediation in order to reveal, and reduce such injustices' (Jenkins et al. 2016, 175). The literature on energy justice provides the conceptual and analytical guidance needed to assess and resolve energy-related dilemmas, both in terms of outcomes and procedures (Sovacool and Dworkin 2015).

The three main constituent elements of energy justice are procedural, distributive, and recognition justice (McCauley et al. 2013). A fourth tenet, restorative justice, has also been proposed by scholars as a way to repair the harm done to people (and/or society/nature) in the past (Heffron and McCauley 2017). Another important framework of energy justice is the eight-principle decision-making framework, which provides tools for policymakers to operationalize energy justice in policy frameworks (Sovacool and Dworkin 2015). The focus has historically been on incorporating procedural and distributional justice into policy frameworks, while recognition concerns have received more limited attention.

The concept of energy democracy emerged at a trade union roundtable organized by the Global Labour Institute at Cornell University in 2012 (Stephens 2019). Energy democracy was framed in terms of three objectives: *resist* the agenda of fossil fuels corporations, *reclaim* to the public sphere parts of the energy economy that have been privatized or marketized, and *restructure* the global energy system to massively scale up RE and other safe low-carbon options, implement energy conservation, and ensure job creation and true sustainability (Sweeney 2012). Burke and Stephens (2017, 35) defined it as 'an emergent social movement advancing RE transitions by resisting the fossil-fuel-dominant energy agenda while reclaiming and democratically restructuring energy regimes.' Szulecki (2018, 35) defines it as

a quasi-utopian 'political goal, in which citizens are the recipients, stakeholders and accountholders of the entire energy sector policy'. While there are disparate conceptualizations of energy democracy, one of the core demands of this movement is for publicly owned and democratically managed energy systems (Burke 2018).

In contrast, discussions in the Global South have historically centred on questions of energy access, energy poverty, institutional distortions (corruption), and enhancing recognition of the needs of marginalized communities, including women (Guruswamy 2011; Lacey-Barnacle, Robison, and Foulds 2020). Of the two, energy justice has found greater resonance in the Global South, whereas energy democracy is still primarily centred in the Global North (Lacey-Barnacle, Robison, and Foulds 2020). We speculate that countries that have a tradition of civic engagement in utility management are more likely to provide fertile ground for energy democracy ideas to take root. For instance, rural electricity distribution in most of the United States is organized through consumer-owned rural electric co-operatives (RECs), over 800 of which continue to deliver ~11 per cent of the total units of electricity sold in the US (University of Wisconsin Center for Cooperatives 2020).

More broadly, the discursive and political context in India is fundamentally different from that of the West (Angel 2016). Here, the justice conversation is dominated by the challenge of access, which is not a major concern in developed countries (Malakar, Herington, and Sharma 2019). Moreover, these discussions assume that the energy system is controlled by a democratic state that presumably supports decentralized RE as part of its developmental discourse. Such assumptions are rarely borne out in the varied contexts of the developing world.

### **The Indian context**

In India, electricity is largely generated using conventional sources of energy such as coal, large hydropower, gas, and nuclear, and a fraction comes from utility-scale solar and wind. Consumers largely play a passive role in this system – they receive electricity, pay a recurring bill, and have limited avenues to participate in electricity planning. Where participation does exist, it usually concerns land acquisition and is often very limited in scope. Decision-making and implementation are carried out by central and state regulators; the ministries dealing with power, coal, and RE; large, corporatized utilities (state-owned or private); grid operators; and frontline staff engaged in billing and maintenance. There are not many avenues for consumers to exercise their voice beyond inefficient consumer grievance channels and sparsely attended public hearings.

The thrust of the RE policy is driven by factors such as energy security, attracting private investment, and domestic political signalling (Shidore and Busby 2019). A vast majority of RE capacity is privately owned as opposed to conventional sources, due to the general push towards privatization in the energy sector since the 2000s (Moallemi et al. 2017). In this sense, the broader public has lesser control over India's RE capacity base than it has over the thermal capacity base, which largely involves public sector undertakings (PSUs). Given this institutional context, the transition to a democratic energy system might seem unlikely.

Nevertheless, energy democracy has entered the discourse on energy transitions in recent years in India, and most notably from the labour movement. Mathews, Barria, and Roy (2016, 2), writing under the banner of Trade Unions for Energy Democracy, lay out a 'core labour perspective' for a just energy transition. The two key political battlegrounds identified by them include the lessening of labour's bargaining power due to an RE policy that favours the private sector and securing democratic rights for communities being displaced by large-scale solar parks. Their vision of energy democracy includes four key demands: (a) rehabilitation of coal areas, (b) redeployment and retraining of the coal sector workforce, (c) ensuring financing for the transition, and (d) public-sector-led and municipalities-controlled RE development. Further, they call for participatory spaces 'where mass organisations and trade unions democratically engage and shape industrial policy' (Mathews, Barria, and Roy 2016, 13).

As a complement to the focus on the coal sector articulated earlier, our chapter explores the opportunities for democratic transitions using RE. While doing so, it is important to critically assess the normative value attached to all forms of RE and not unequivocally equate RE penetration with advancing energy justice and democracy in the Global South. First, justice effects are not inherent to the expansion of RE, but depend on choices concerning scale, siting, and ownership of RE (Banerjee et al. 2017). Second, a normative preference for renewables over traditional sources like biomass and charcoal has been characterized as an 'elitist interpretation of modernist development ideology' resulting from the lack of a nuanced understanding of traditional sources (Munro, van der Horst, and Healy 2017, 640). Third, the Global North has been accused of 'energy bullying' or promoting RE development that would benefit corporations based there (Monyei et al. 2018, 2019; Todd et al. 2019).

In sum, energy justice and energy democracy are powerful tools for any country in the process of finalizing its energy trajectory, but they need to be applied carefully in the context of developing countries. This includes adapting key frameworks to suit the local context as we seek to do in the following section.

## Analytical approach and research methods

While energy justice and democracy have their own unique histories, they are interrelated, and policy instruments that contribute to one can reinforce the other. Policies play an important role in establishing the direction of change and the rules of the game. To the best of our knowledge, no other work to date has examined energy justice and democracy from the perspective of state policies in India. We analyse both concepts in this study through the identification of policy clauses that move us towards fair distribution and more democratic procedures.

Energy is a concurrent subject in the Indian federal system. While the Centre sets the overall trajectory through planning and financing, it is at the state level that policy implementation and distribution of electricity occurs. The financial support provided by the Centre and its priorities provide structure to the overall electricity system's transition. However, states control important levers that influence the realization of distributional and procedural goals. States also vary in their approach to governance (such as the extent of decentralization), which can influence and inform their approach to electricity governance (Dubash, Kale, and Bharvirkar 2018). Identifying the creative ways in which some states have accommodated justice concerns within the federal framework demonstrates the feasibility of achieving a more just policy framework.

Our analysis is rooted in this context and reads these policies using an Indian and, more broadly, Southern lens. Our reading of distributional justice begins with the question of access since this continues to be a dominant challenge in the Indian context. Cross-sectoral initiatives that distribute the benefits of electrification through employment and increased economic activity are central to our interpretation of distributional justice. With respect to more democratic procedures, our analysis accounts for the low purchasing power among domestic consumers of electricity and the low levels of financial and personnel capacity required for decentralized management. The elements of our framework are detailed in the following paragraphs.

First, with respect to access (distributional goals), we look for both the *identification* of underserved groups and the *recognition* of their specific electrification needs. Identification occurs when a target group is mentioned in the policy as a potential beneficiary of better electricity access. Recognition pushes the conversation beyond connectivity and asks whether these underserved communities can afford and use electricity over the long term. For example, electrification of poor rural households needs to recognize their particular spending patterns and prior experience with metering systems. KWh-based metering and monthly billing cycles impose informational and financial burdens on the poor (Winkler et al. 2011). On the other

hand, service-based charges or fixed daily payments mimic existing expenditure patterns on energy services in poor households (Sharma, Palit, and Ramakrishnan 2016). Due to their modularity and zero fuel cost, distributed and decentralized solar energy offer more opportunities than the legacy system for restructuring business models to ease access for the poor. Several alternative models of service provisioning have been attempted by the private and non-profit sectors and can offer guidance on how to transition poor consumers to cleaner sources of electricity (Bhattacharyya 2013). In our review of state policies, we identify specific instances where state policies on RE move from simple identification to the recognition of consumers' needs.

Second, a truly distributive system must aim to not just redistribute electricity access but the developmental benefits accruing from electricity. The strong relationship between energy and development is well established in the literature (Alstone, Gershenson, and Kammen 2015). However, small quantities of electricity supplied at the household level do little to improve socioeconomic outcomes (Aklin et al. 2017). In addition, rural enterprises require several important non-electricity inputs to achieve growth and financial sustainability (Ganguly et al. 2020, Willcox et al. 2015). Policies seeking to distribute the benefits of electrification more fairly, therefore, need to do more than just focus on electricity supply and should actively seek cross-sectoral integrations. This would require coordination and integration across multiple domains such as skilling, human resource development, enterprise development, and education. However, such overarching strategies and goals for integration are often not supported by instruments that increase coordination and convergence through the provisioning of governing resources such as funds, legislative orders, and interdepartmental working groups or the explicit integration with existing government programmes (Candel and Biesbroek 2016; Candel 2019). In our analysis, we explore the strength of and variation in coordination mechanisms across states.

Third and finally, we discuss democratic procedures that allow for wider, more inclusive, and fair public participation in RE deployment. Based on a review of the literature, we identify three sets of instruments to meet procedural goals: instruments that (a) facilitate ownership and ease transactions, (b) decentralize legacy institutions, and (c) enhance just participation. The primary goal of instruments that facilitate ownership and ease transactions is to increase the amount of RE used by consumers or fed into the grid. Net-metering policies link individuals and the grid by allowing users to consume as well as sell the electricity generated by their solar power systems. These instruments aim to create *prosumers* – individuals or groups that both produce and consume energy. In certain business models, ownership is transferred

to new market participants who can either save money on utility bills or earn an income by selling excess electricity to the grid. While existing literature considers net and gross metering to be 'key policies for energy democracy', they might only mark an incremental step towards democratization in certain contexts (Burke and Stephens 2017, 39). For example, if the rights and responsibilities of rooftop owners, tariffs, and regulations are all strongly controlled by central and state regulators, these instruments can end up only facilitating exchange or transactions but not ownership. In our analysis, we seek to highlight policies that go beyond just offering metering options and create opportunities for more consumer participation.

Our second set of instruments includes those that decentre legacy institutions and pave the way for decentralized institutions to manage electricity. Co-operatives, farmers associations, and self-help groups are commonly recognized as institutions of decentralized governance in the extant literature and policy discourse. These institutions can facilitate a transition towards a more democratic energy system because they are already built on the idea of community participation. However, there are three reasons why they might not aid a democratic transition at scale. First, managing complex infrastructure such as electricity will require a significant amount of capacity-building. Experience with rural electrification projects involving village energy committees (VECs) or voluntary groups constituted for the management of decentralized solar energy systems has been mixed (Chaurey et al. 2012; Palit et al. 2013). VECs often do not have the manpower or technical capacity for managing local energy systems and need support from technical partners over the long term (Sharma et al. 2014; Sharma and Palit 2020). Second, these groups are largely membership-driven organizations without an electoral mandate. This raises questions about their representation and their accountability toward the larger community. There is also the possibility of elite capture, which makes them an ineffective partner in the transition to more democratic systems. Third, these groups do not have the same status as the government departments that they have to engage with during the implementation and management of decentralized electricity systems. They are likely to face significant hurdles in transacting with the government machinery given their unequal share of power in governance processes. This is where existing, *elected* institutions of decentralized governance such as village panchayats and urban local bodies (ULBs) are likely to be better candidates for facilitating a democratic electricity transition. While short-term implementation goals might be achieved by transferring ownership to community groups, a longer-term vision for democratic transition must consider the involvement of elected institutions of governance. In our analysis, we will identify cases where policies have looked beyond voluntary groups and associations, and have sought to empower



ected institutions of governance by involving them in decision-making regarding energy production and management.

The third set of instruments promotes just participation. In the Indian context, displacement and loss of livelihoods resulting from infrastructure development are well documented. Development-induced displacement has been studied in the case of the Sardar Sarovar Dam on the Narmada river, the displacement of residents of urban informal settlements during the Delhi Commonwealth Games, and in mining, among other sectors (Baviskar 1995; Kohli 2013). On similar lines, Yenneti and Day (2015) offer in-depth case studies of the lack of procedural justice in the Charanka Solar Park project in Gujarat, which led to the displacement of local communities and loss of livelihoods. In this study, we seek to identify instruments that foster a participatory approach that considers the livelihoods of local communities in solar energy transitions.

Finally, Indian scholarship on RE has highlighted the emancipatory potential of decentralized electricity systems (R. D'Souza 2019). In 1960, D. D. Kosambi argued for decentralized solar energy managed by communities without any aid from the government. For him, this was the only form of technology that would realize a truly socialist energy system 'without the stifling effects of bureaucracy and heavy initial investment' (R. D'Souza 2019, 42). Amulya Reddy was another influential advocate for democratizing energy who advocated for the self-reliance of villages through employment-generating, community-owned, off-grid energy systems. This vision has shaped the RE debate in India for many years, until recently. Since the Electricity Act 2003, the thrust of electricity policy has been towards liberalizing electricity generation, adding capacity primarily through large thermal powerplants, and expanding grid-based access. The final section of our analysis gives a big picture view of the current status of centralized and decentralized electricity systems and India's progress towards a just and democratic electricity system.

## Methods

We analysed the latest versions of the notified solar energy policies of each state, as uploaded on the RE departments' websites. There is wide variation in the formats of these policies – some states have a single document, while others have two or three different documents for large-scale solar power plants (grid-connected, utility-scale solar power) and decentralized solar power (also referred to as distributed generation, mini-grids, or decentralized distributed generation) or rooftop systems. Further, some states have an RE policy covering multiple sources and no individual solar energy policies, while some have both. If the RE policy was the only available

policy, we only reviewed the solar energy section within it. If both RE and solar policies exist, we reviewed only the solar policy in cases where the RE policy was ratified earlier. Some states also have solar-hybrid policies and, where available, these have been included for review. Any amendments to the latest version of the solar or RE policies have also been included.

Our analysis involved a close reading of the policy documents to identify from the preamble, objectives, and clauses the references made to the *distributional and procedural goals* of the proposed solar energy transition. Clauses within policies that mention such goals were manually highlighted and coded into a worksheet along with the clause and page numbers. We then examined the occurrence and objectives of such clauses across policies by employing the lens of interpretive policy analysis (Yanow 2007).

## Data and observations

The distribution of different types of policy documents across states is depicted in Table 3.1.

## Analysis and discussion

In terms of distributional goals, we find that most policies continue to exclude significant marginalized groups. Where groups are included, the focus is more on identifying them rather than recognizing their specific needs or the processes by which they can effectively transition to becoming full consumers of electricity. We also noticed that distributional goals beyond simple access are mentioned in the preambles of policies, but are not substantiated by an allocation of tools to foster the cross-sectoral collaboration required for their implementation.

Among the three sets of procedural instruments, those that facilitate ownership and ease transactions were emphasized and elaborated on more than those that decentre legacy institutions or enhance just participation. With the exception of invoking urban municipal bodies to amend by-laws to facilitate rooftop solar, the limited attention given to new institutional arrangements and just processes of participation reflects the norms of the legacy electricity system. Overall, the policies tend to keep the system in its current configuration and forego the opportunity solar provides to create transformative change beyond reducing emissions.

In the next three subsections on distributional and procedural goals, we have used examples from different states to elucidate the various sets of instruments for operationalizing energy justice in Indian solar policies. We have also conducted

**Table 3.1** Source of solar power policies across states

State	Single State Solar Policy	RE Policy	Multiple Policies	Hybrid Policies	Amendments
Andhra Pradesh	█			█	
Arunachal Pradesh					
Assam	█				
Bihar		█			
Chhattisgarh	█				
Goa					
Gujarat				█	█
Haryana		█			█
Himachal Pradesh	█				
Jharkhand			█		
Karnataka					█
Kerala		█			
Madhya Pradesh	█				
Maharashtra	█				
Manipur	█				
Meghalaya		█			
Mizoram	█				
Nagaland					
Odisha	█				
Punjab		█			█
Rajasthan	█			█	█
Sikkim	█				
Tamil Nadu	█				
Telangana	█				
Tripura			█		
Uttar Pradesh			█		
Uttarakhand	█				█
West Bengal		█			

*(Contd)*

*(Contd)*

State	Single State Solar Policy	RE Policy	Multiple Policies	Hybrid Policies	Amendments
J&K					
Delhi					

*Note:* The black boxes represent the policy documents included in the analysis. Two states (Maharashtra and Chhattisgarh) had policy documents only available in regional languages and have thus been excluded from our analysis.

a comprehensive assessment of state policies, using the methods described in the earlier section titled 'Analytical approach and research methods,' to identify the presence of policy instruments for achieving energy justice goals. These results are synthesized in Table 3.2.

### **Distributional goals: identification versus recognition**

All the reviewed solar policies include provisions for greater distribution. The most commonly identified target groups are farmers and residents of remote and rural areas who are not connected to the national electricity grid. Policies suggest standalone solar pumps for farmers and either standalone solar home systems or community-level mini-grids for remote and rural locations.

This is a straightforward concern about distribution – farmers and remote communities are indeed important groups from a distribution perspective. However, the policies fail to mention women, residents of urban informal settlements, and nomadic and pastoral groups. There is evidence of gender-based disparity in electricity access and use and lack of access in urban informal settlements and among pastoralist groups (Baruah 2015; Debnath et al. 2020). Given the nature of their electricity demands, mobility, and low-paying capacities, these groups can be particularly well-served by decentralized and small-scale solar power.

The reviewed policies also fall short of recognizing the specific needs of the populations they wish to serve through solar energy transitions, with two exceptions. The Kerala 2013 Solar Energy Policy takes a step towards recognition by stating that 'for consumers with monthly consumption of 30 units and below efforts shall be made involving welfare departments of Government and LSGIs (Local Self Government Institutions) to solar enable them and in such cases, a special feed-in-tariff scheme shall be notified' (Government of Kerala 2013, 7). While there is insufficient information to draw any conclusions about outcomes, in terms of intent, this provision suggests that consumers with very low loads of below 30 units a month need to be given special tariff considerations. The Karnataka Solar Policy 2014–2021

**Table 3.2** Presence of policy instruments for energy justice in state solar policy documents

	Distributional goals		Procedural goals		
	Recognition beyond identification	Cross-sectoral integration for justice	Facilitation of ownership and easing transition	Decentering of legacy institutions	Enhancement of just participation
Andhra Pradesh			*		
Arunachal Pradesh					
Assam	*			**	
Bihar	*	**		**	
Chhattisgarh					
Goa					
Gujarat	*	**			
Haryana	*			*	
Himachal Pradesh	*		**		**
Jharkhand	*	*	**	**	
Karnataka	**	**	*	**	
Kerala	**			**	**
Madhya Pradesh	*				
Maharashtra		*			
Manipur					
Meghalaya					
Mizoram	*	**	*		*
Nagaland					
Odisha	*	*		**	
Punjab			**		
Rajasthan	*	**	*	**	**
Sikkim	*	**	**	*	
Tamil Nadu			**	**	*
Telangana				**	**
Tripura					
Uttar Pradesh	*	**			

(Contd)

(Contd)

	Distributional goals		Procedural goals		
	Recognition beyond identification	Cross-sectoral integration for justice	Facilitation of ownership and easing transition	Decentering of legacy institutions	Enhancement of just participation
Uttarakhand					
West Bengal	*			**	**
Jammu & Kashmir					**
Delhi		**	**	**	

Note: \*\* (double asterisks) represents a clear or strong occurrence and \* (single asterisk) represents a partial or weak presence of policy instruments in the relevant category. Grey cells imply that the policy or translation was unavailable. The empty cells represent 'gaps' or a lack of any instruments for the category.

provides exceptional financial assistance of ₹1 crore for small solar parks (but >100 acre in size) located in 'backward districts' (Government of Karnataka 2014, 10). Similar to Kerala, there is insufficient information on whether the needs of these districts are recognized beyond mentioning that the solar parks must be small.

Our findings bring up the question of whether we should expect policy documents to go into such detail; after all, they are meant to offer broad guidance. Here, we point to the discrepancy in the extent of detail provided for policy clauses relevant to underserved populations and those relevant to wealthier urban residents or corporations. Most policies focus on promoting new business models and strategies to increase the penetration of utility-scale and rooftop solar power plants, none of which embody distributional goals. These include multiple business models for solar rooftop power plants, detailed net and gross metering policies, bidding guidelines, and land acquisition procedures, among other enabling policy mechanisms. A more holistic vision of a just transition needs to look beyond replicating the metrics of the legacy electricity system and move towards recognizing the specific needs, spending patterns, information asymmetries, and transaction costs associated with different target groups in accessing electricity.

### Distributional goals: cross-sectoral integration for justice beyond access

Across all policies, the preamble and objectives emphasize (a) transitioning the electricity system towards cleaner sources of energy, (b) energy security, and

(c) serving marginalized populations. Several policies, however, aim to extend the scope of their goals beyond the electricity sector and mention sustainable development, jobs, and creating rural enterprises. This second set of policy goals are fundamentally distributive in nature, as they seek to provide the developmental benefits accruing from electrification to previously underserved populations. Referring to our framework, however, we find little evidence that such goals are supported by instruments to enable cross-sectoral collaboration, with a few exceptions.

Some state policies refer to a mechanism for training and absorbing unemployed youth into the solar industry mentioned in India's national solar energy programme – the Jawaharlal Nehru National Solar Mission. While it has been mentioned in the policies, there is no indication of policy integration at the state level. Two state policies stand out in terms of seeking explicit convergence with non-electricity sector policies that could lead to employment generation. Bihar's Renewable Energy Policy of 2017 aims to forge partnerships for skill development and capacity-building with the existing Bihar Rural Livelihoods Project, JEEViKA, to 'reach out to local youth especially women to support entrepreneurship at the grass-root level, to improve socioeconomic conditions of financially underprivileged' (Government of Bihar 2017, 16). On similar lines, Gujarat's Solar Policy from 2015 (Government of Gujarat 2015) explicitly makes linkages to existing industrial development programmes to enable convergence, specifically with the Gujarat Industrial Policy of 2015 and the Electronics Policy for the State of Gujarat (2014–2019), both of which extend state-level incentives for the development of RE and semiconductors (Government of Gujarat 2015, 21).<sup>2</sup> Besides programme convergence, creating institutional structures to coordinate cross-sectoral activities is also important. A few states, such as Delhi, Karnataka, Rajasthan, and Mizoram, have constituted empowered committees consisting of officials from departments such as power, urban development, PWD, environment, and finance, typically under the chairmanship of the chief secretary. In summary, while some exceptions exist, there are limited instruments across states to enable the much-needed cross-sectoral collaboration for meeting broader distributional goals.

<sup>2</sup> Several states have provisions to ensure convergence between building codes and solar energy use. West Bengal proposes mandatory installation of Solar PV rooftop systems. Other policies such as those from Delhi, Rajasthan, Odisha, Sikkim, and Jharkhand also propose reframing building codes for facilitating solar energy installations. We mention this as a footnote since this convergence, while important, does not directly address our point on framing convergence as a means to achieve greater justice.

## Procedural goals

### *Instruments that facilitate ownership and ease transactions*

All the reviewed policies focus extensively on instruments such as net and gross metering. The term *prosumer* is used across policies in sections describing solar rooftop systems and a range of business models to support uptake is described. However, as we argue in our analytical framework, while such instruments play a role in re-distribution, they might only make an incremental shift towards more democratic ownership.

A few policies imagine metering beyond facilitating transactions. The policies of Delhi, Jharkhand, and Sikkim include virtual metering in addition to net and gross metering (Government of Jharkhand 2018, 4; Government of NCT of Delhi 2016, 7; Government of Sikkim 2019, 6). Virtual net metering allows potential prosumers without rooftops to invest in community rooftop systems, either within their neighbourhoods or outside them. While the exchange of electricity with the grid remains the same as with net metering, this policy innovation deepens participation in two ways: first, consumers who would otherwise be unable to install a rooftop system now can. This would be particularly relevant in dense urban areas. Second, this can, in turn, increase the size of the community investing in decentralized systems, leading to a greater potential for bargaining power.

### *Instruments that decentre legacy institutions*

Co-operatives, farmers' associations, and self-help groups are commonly recognized as new institutions of decentralized governance. However, as argued earlier, their limited capacity to manage complex infrastructure, non-representativeness, and lower status compared to government departments limit the scope of their contribution in the transition to a democratic energy future at scale. Instead, elected institutions of decentralized governance must also be considered. Some policies move us in this direction by indicating that panchayats and municipalities can play a role in managing and implementing solar power plants. Bihar's Renewable Energy Policy 2017, for example, notes the role of 'registered companies, government entities, partnership companies/firms, individuals, consortia, *Panchayat Raj Institutions*, *Urban Local Bodies*, Co-operative or registered society [*sic*]' (Government of Bihar 2017, 3). Kerala's Solar Energy Policy 2013 similarly emphasizes the role of local self-governments in power production and proposes introducing 'incentive[s] for people's representatives/panchayats [to promote] solar installations and street light optimization', making a rare reference to representative government entities



(Government of Kerala 2013, 6). The West Bengal RE Policy 2012 explicitly states that 'urban local bodies will form an essential part of the comprehensive solar policy for cities' (Government of West Bengal 2012, 17). Some states like Assam and Jharkhand go a step further by proposing the amendment of municipal by-laws to facilitate the adoption of solar rooftop systems (Government of Assam 2018; Government of Jharkhand 2018).

### *Instruments that enhance just participation*

In 2017, the Ministry of New and Renewable Energy relaxed the requirements for environmental and social impact assessments (EIA/SIA) for utility-scale solar power projects, including solar parks. This is reflected in the state solar policies released subsequently. Some state policies, however, do take steps to ensure fair compensation for communities whose land is being acquired for solar energy projects. Himachal Pradesh's policy states that '1% of the total cost of the project, as fixed by HPERC (Himachal Pradesh Electricity Regulatory Commission)', will be paid to the Local Area Development Fund for 'community development works', for government land on which people have community rights (Government of Himachal Pradesh 2016, 12). Similarly, Telangana's policy states that 'development charges and layout fee of INR 25,000 per acre basis shall be levied payable to the respective Panchayat', in the section on 'Ease of Business: Enabling Provisions' (Government of Telangana 2015, 11). Rajasthan's policy also mentions that the solar power producer shall contribute a sum of ₹25,000 per MW towards the Local Area Development Fund on a one-time basis (Government of Rajasthan 2019, 16). Among the remedial measures, there is an overwhelming emphasis on monetary compensation, while rehabilitation and resettlement are not explicitly mentioned. Monetary compensation can be inadequate because it does not account for appreciation in land value, the importance of land as a source of employment and its role in the socio-cultural dimension of people's lives (Maitra 2009; Yenneti and Day 2015). In simpler terms, one-time compensations cannot substitute for long-term losses of livelihood, and while compensatory processes involve some community consent and participation, they are far from just.

A few policies make bolder attempts to protect the rights of communities. Kerala's policy makes several provisions for the use of tribal lands, such as: 'The willingness of the land owner is mandatory'; 'The land ownership rights shall continue to fully vest with the original owner. The developer shall have only rights to setup and operate the project. The landowner will have the right to use land for agricultural purpose'; and 'Revenue (not profit) sharing based on the power generated, possibly in the range not below of 5% is envisaged' (Government of Kerala 2013, 8). The West Bengal

policy is one of the few offering specific guidance on earmarking compensation for rehabilitation and resettlement purposes through the clause, 'Developer acquiring land must provide money (1% of project cost) to rehabilitate and resettle displaced people, for local development activities like building schools' (Government of West Bengal 2012, 32). The West Bengal and Jammu and Kashmir policies are notable for having a separate section on social and environmental issues (Department of Science and Technology 2013). Most policies, however, limit themselves to the technical and financial details of implementation.

### The bigger picture

India's 100-GW grid-connected solar target consists of sub-targets for large- or medium-scale solar (60 GW) and distributed solar (40 GW). In practice, the vast majority of realized capacity is in the form of large-scale plants. By the end of 2019, India had 35.7 GW of solar capacity, of which only 4.4 GW was rooftop solar (Sanjay 2020). This suggests that India is swiftly moving towards a system configuration where utility-scale solar (and wind) will replace large thermal generators while retaining the existing institutional and political structure of the energy system. Decentralized energy systems, and their potentially emancipatory politics, are likely to get sidelined if these trends continue.

Most states resort to presenting large-scale solar parks and decentralized solar as different options, modes, models, or categories of projects. Some states present MW targets for decentralized capacity. However, on the whole, policy documents shy away from choosing between centralized and decentralized typologies. This 'all-of-the-above' approach reveals that the key priority for states is rapidly increasing deployment, irrespective of how it happens. Delhi stands out by framing its solar policy explicitly around rooftop solar, but this is perhaps only because of the limited space available for utility-scale solar in Delhi.

Further, decentralization alone is not sufficient to ensure community ownership as envisioned by energy democracy scholars. Within the rooftop segment, for example, the renewable energy service company (RESCO) model, where the developer retains ownership of the solar installation, constitutes 35 per cent of the rooftop capacity and is gaining steam (Bridge to India 2019; CII 2019). While some state policies, like Punjab, Jharkhand, Odisha, and West Bengal, mention increasing community participation in the electricity sector, none of them provides a mechanism to ensure increased *public ownership* of energy infrastructure (Government of Odisha 2013; Government of Punjab 2012). This question is partly engaged with in the Kerala policy, which states that 'a wider community ownership model with direct financial

stake by the public shall be encouraged' for a niche segment – floating solar plants and public place installations (Government of Kerala 2013, 6).

Our survey of state RE plans, alongside the installed capacity numbers, suggests that India is in the process of reconfiguring its energy system – in terms of scale, ownership, and spatial spread – in line with the existing system. A push to ensure community ownership and control is almost completely missing from political discourse. While we do not wish to uncritically advance decentralized systems as the normative choice for India, we do intend to highlight that a monumental political process is underway right now without much public deliberation. The outcome of this process may lock in institutional effects that limit a just and democratic energy transition.

## Conclusion

Our analysis focuses on solar power policies at the state level, given the salience of solar energy in India's current drive to realize an energy transition. We find that while energy justice concerns are not the core of state solar policies, there are innovative provisions in some of them that could create a more fair and participatory system if scaled widely. While this is a critical first step, research on questions of energy justice and democracy is nascent in India and several opportunities for further work exist. Future work in this space can develop in two directions.

First, from an empirical perspective, our analysis is limited to solar energy transition given the significance of this resource in India's current RE discourse. Similar distributive and procedural justice frames can be applied to other energy sources and forms of energy use (transportation, heating, cooking). Other sources and uses vary in their levels of complexity, organizational and institutional architecture, and resources required for their uptake. This could yield more nuanced insights on planning for just and democratic transitions. Second, more fundamental processes of democratic participation in the Global South need to be theoretically explored in the context of energy. Our framework largely refers to policy processes, but makes some fundamental assumptions about how and why people participate in democratic processes and the co-production of public services. The literature on coproduction is still nascent in the Global South and has the potential to offer insights into whether and under what conditions individuals and groups will be willing to own and manage complex public infrastructure.

The goal of our analysis has been to bring into focus the broader injustices and political visions for India's RE transition. This is by no means discounting the historic impetus of increasing energy access and sufficiency. Rather, we wish to reframe what radical success looks like in the Indian energy sector, both from a

developmental and a climate mitigation point of view. Achieving multiple objectives (access, social justice, job creation, and affordable power) simultaneously is the only way to develop sustainably. This requires critically evaluating whether our energy politics, especially our RE politics, can truly achieve our stated developmental and social goals beyond decarbonization. Bringing in greater justice and democracy in the energy discourse serves as an entry point for this exercise.

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