# Power, Policy and Progress: The evolution of the Energy Policyscape in Jammu and Kashmir

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#### <u>Abstract</u>

This paper explores the contours of energy policy in Jammu and Kashmir, that have been shaped by the interplay of technological innovations, institutional reconfigurations, and shifting governance paradigms. The analysis begins with the state's early reliance on hydropower projects, which were central to its sociotechnical imaginaries, developmental aspirations and energy security strategies. However, in present times there is increasing focus on decentralized renewable energy systems, including solar, small hydro, and smart grid technologies. The paper critically examines the neoliberal shift in energy governance, marked by the privatization of electricity generation, the restructuring of distribution companies (DISCOMS), and the introduction of smart meters, alongside evolving electricity laws. It also explores dedicated plans and policies for rural electrification, which have sought to address energy access disparities but remain constrained by a supply-oriented approach that often overlooks the complex, interconnected challenges of energy security, equitable access, and environmental sustainability. By challenging linear narratives of progress, the paper reveals the fragmented and contested processes that characterize energy governance in a region grappling with ecological fragility and developmental imperatives. It argues for a shift from the conventional supply-focused energy strategy to a more holistic approach that simultaneously addresses energy security, equitable access, and environmental protection, offering critical insights into the complexities of aligning energy policies with sustainable development goals in the Global South.

**Keywords:** Energy Policy, Policyscape, Electricity, Jammu and Kashmir, Power, Progress

#### 1. Introduction

Energy systems form the backbone of modern-day economies. energy systems evolve in tandem with technological and societal changes, often marked by periods of disruption and adaptation such as successive periods witnessing colonial legacies, postcolonial development strategies, and contemporary energy challenges. Until around 200 years ago, the world economies were almost entirely powered by renewable sources powered by the sun, whether in the form of solar energy converted to food as fuel for humans and animals, into woodlands to provide firewood, and into wind power and water power used to power transportation and machinery. However with the advent of industrialisation, an Energy Transition–whereby coal replaced wood and biomass materials–started taking place (Podobnik, 2006). Newer forms and methods of harnessing energy have been become commonplace since then, such as generation of hydrolelectricity. Post-Industrialisation world requires energy systems not merely as technological infrastructures but socio-technical configurations powering the economy, and at the same time being embedded in socio-political, economic and cultural frameworks that co-

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produce their design and governance. Within this context, this paper focuses on the evolution of the Energy landscape focussing on electrical energy in the state of Jammu and Kashmir–since its early Energy Transition towards hydroelectricity in early twentieth century(Bhaduri and Abubakr, 2023)–to the present times. The evolution of this particular Energy landscape has been systematically shaped by various plans, policies and programs as well as being moudled by various socio-technical imaginaries of progress.

A close look at the energy policies of Jammu and Kashmir(henceforth referred to as J&K), a state with abundant hydropower potential, reveals multiple actors and institutional frameworks operating at various levels negotiate the contours of energy transitions. As the global imperative to decarbonize accelerates, subnational entities like J&K serve as critical nodes in implementing and innovating energy strategies. The state's energy landscape reflects a convergence of aspirations: national-level objectives of energy security and sustainability intersect with local demands for equitable access and environmental preservation. These aspirations, however, are mediated by structural challenges, including seasonal energy variability, geographic constraints, and socio-economic disparities. This paper situates the evolution of Jammu and Kashmir's energy trajectory within the broader co-constitutives relationship between policy, technology, economy and society, exploring how global discourses on renewable energy and sustainability manifest in the localized practices of this Himalayan state.

# 2. Energy Policyscape: In lieu of a literature review

Energy as a motive force fuels progress and processes and is emerging as a contested terrain due to transitioning energy paradigms worldwide. Energy drives the contemporary world's machinery, appliances and equipment, and is the lifeblood of development. As businesses, transportation, and residential life become increasingly interconnected, the energy demand has increased to previously unheard-of heights. In addition to driving economic growth, this unquenchable desire for energy poses a serious threat to the environment and the planet's future. The energy challenge in the present-day epoch of the Anthropocene has global implications due to resource scarcity accompanied by enormous population growth in an increasingly unpredictable social and environmental climate. An emerging scholarship of 'energy policy landscapes' has been continuously pushing the envelope to explore overlapping and interactive subject-object relationships, and over the course of many decades, various international institutions, countries, states, and local governments have implemented dedicated energy policies to achive various objectives such as resource adequacy, access to energy, mitigating pollution and to achieve global climate change objectives of the twenty first century to balance growth, development and sustainability ( Das, A. et.al., 2024 ; Zohuri, 2023).

Another essential concept relevant to this discussion is the theoretical frame of a 'policyscape', which encompasses a conceptual landscape of policies created in the past that establish themselves as institutions have over a period of time, and having ramifications for governing operations, policy agendas, as well as social and political behaviour (Mettler, 2016). These policies that constitute a policyscape are not static, and they follow trajectories that even the creators of these policies would not have fathomed, leading to lateral effects, design changes and unintended consequences (Mettler, 2016).

Energy security is one of the most commonly occuring component of energy policyscapes. Energy security, has been defined by the International Energy Agency(henceforth referred to as IEA) as 'the reliable supply of energy at an affordable price' (IEA, 2001). Energy security debates are becoming increasingly critical due to volatility in world energy markets, stern competition for energy resources, and the global imperatives of economic development and poverty reduction (World Bank, 2005). As opposed to the IEA's simplistic definition of energy security as a reliable and affordable supply of energy, many scholars have broadened its horizon to define it as consisting of fours A's, i.e (Availability, Affordability, Accessibility and Acceptability), however, two of the four As – availability and affordability – have dominated the discourse onclassic energy security studies (Deese, 1979; Yergin, 1988). The other two As – accessibility and acceptability – are relatively recent phenomena, as both constituted the global energy goals of the World Energy Council in its *Millennium Declaration* (WEC, 2000), however, they weren't linked to energy security until 2007 (APERC, 2007).

Cherp and Jewell (2014) have critically examined Energy Security beyond the 'four As of energy security' (availability, accessibility, affordability, and acceptability) and they argue to account for vulnerabilities and resilience vis-a-vis Energy Security. Cherp and Jewell problematise the concept of energy security as 'low vulnerability of vital energy systems'. This perspective paves the way for a thorough investigation of vulnerabilities as a confluence of risk exposure and resilience, as well as the connections between vital energy systems and crucial social functions. Other perspectives on Energy security involve assessment of (a) security of supply and production, and (b) emergent insecurities (such as availability and pricing) to promote the safeguarding of energy supply and local production capabilities (Ang et al. 2015, Mansson et al. 2014).

With respect to energy governance, the most commonly used approaches have so far focussed heavily on production and consumption as distinct outcomes of energy provision, whereby energy supply is governed by piecemeal and temporary responses without accounting for 'fairness' and justice (Florini and Sovacool, 2009). A holistic lens to account for 'fairness' and to envisage long-lasting solutions to energy policy and governance is through the theoretical framework of 'Energy Justice'. Energy Justice not only acknowledges energy needs but also explores how to distribute the benefits and burdens of energy systems in a fair manner (Sovacool 2014). Energy Justice has been defined by Sovacool and Dworkin (2014) as a just global system where both benefits and costs of energy services are shared, and where representation and impartial decision making are ensured on the path towards eradication of 'Energy Poverty'. Energy Poverty encompasses lack of adequate, affordable, reliable, environmentally sustainable and safe energy services (Dong et al., 2021; Halkos and Gkampoura, 2021a; Halkos and Gkampoura, 2021b).

# 3. Energy Indicators of Jammu and Kashmir: A Bird's Eye View

The state of Jammu and Kashmir possesses swathes of hydropower potential which, when exploited fully, can boost the state's economy. Developing this potential requires large-scale investments, resources, technical expertise, administrative reforms, proper regulation and management, besides competitive marketing, policy formation and people's participation. Optimising the usage of this enormous hydropower potential would not only enable the state to meet its internal energy needs but would also allow for supplying electricity to other states.

Jammu and Kashmir has an estimated hydropower potential of 20,000 Megawatts (MW) of which 16,475 MW have been recognized, with the Chenab basin having 11,283 MW, the Jhelum basin having 3084 MW, the Ravi basin having 500 MW, and the Indus basin having 1608 MW (Sharma and Thakur, 2017). Jammu and Kashmir's energy profile reveals an installed capacity of approximately 3,800 MW, with a significant reliance on hydropower and growing contributions from solar energy. However, in comparison with neighbouring Himalayan states such as Himachal Pradesh, J&K has not lived up to its potential. J&K and Himachal Pradesh each have an estimated hydropower potential of around 20,000 MWs. Hydel power potential of both J&K and Himachal Pradesh states is estimated at 20,000 MW each. According to the Government of Jammu and Kashmir's Economic Survey, 2016, the State of Himachal Pradesh has harnessed capacity/projects to the extent of 6370 MW (32% of estimated

potential) while as J&K State has exploited 3263.46 MW (16% of estimated potential) only.

Despite possessing a huge hydropower potential, Jammu and Kashmir remains energydeficient, relying on external sources to meet its energy demand and in turn having fiscal ramifications on the state's finances and expenditures. Therefore, a dispassionate analysis has been intended in this paper to explore the interplay between national energy policies, plans and programmes on one hand, and, state-level initiatives like the State Action Plan on Climate Change (SAPCC), dedicated solar, small hydro and wind power policies, and neoliberal reforms such as privatization of the government run Power department and distribution companies (DISCOMS), and digitalization through smart metering. These 'reforms', envisaged at improving efficiency, have also led to rising electricity prices, raising concerns about affordability and equity for consumers. As compared to other states, an institutional hiccup that has stalled harnessing of hydropower on a large scale in Jammu and Kashmir is the Indus Water Treaty (IWT). The Indus Water Treaty (IWT) between India and Pakistan means that J&K is the only state in India where all hydropower projects, both under development and previously commissioned, are based on the run-of-the-river kind (Kumar and Thakur, 2017). Another dubious distinction of Jammu and Kashmir, vis-a-vis it's electricity scenario is that J&K has been consistently topping the charts among Indian states and Union Territories when it comes to Aggregate Technical and Commercial (AT&C) losses. AT&C losses are the sum of technical and commercial losses in a power distribution system, and according to government data the AT&C losses in Jammu and Kashmir for the year 2020-2021 was a whopping 59.28% (Press Information Bureau Government of India, 2023).

The Jammu & Kashmir State Power Development Corporation Limited (JKSPDCL) was founded by the J&K government and formed as a private limited company on February 16, 1995, to assume control of, carry out, finish, run, and maintain all of the State's power plants and projects. The Corporation received the assets of every electricity plant in the state, both the completed ones and those in the planning stages. The Corporation now owns 20 hydroelectric projects, including 450 Megawatts Baglihar Hydroelectric Project, and several other power plants with an installed capacity of 758.70MW spread throughout several regions of Jammu & Kashmir. At Pampore, close to Srinagar, the Corporation has 175 MW of installed gas turbines based on High Speed Diesel. Ten small Hydroelectric plants have been assigned by the Jammu and Kashmir State Power Development Corporation (JKSPDC) in 2003, complying with the State Hydel Policy to Independent Power Producers (IPPs).

Despite the aforementioned power generation capacities of the state, there have been criticisms that the lion's share of total electric power generation of the state's installed capacity is not controlled by the state, but by the National Hydroelectric Power Corporation (NHPC). Many experts and critics have posited that there is a consensus among numerous individuals, including the state's top leadership, regardless of political affiliation, who think that transferring these NHPC projects to the state Government will resolve the state's energy scarcity (Drabu, 2018). Even the central government appointed Group of Interlocutors had remarked that the hydro-electricity potential of the state be tapped and further hydro-electric projects be set up for which the central government should meet the entire equity capital. The following pie chart (Figure 1) employs government data from the official website of the state Power Development Department(JKPDD) to graphically illustrate the sector-wise installed capacity of electric power generation between the Centre, State and Private players.

# Figure 1 : Sector-wise Installed Capacity of Electric Power Generation in Jammu and Kashmir



### Source: JK PDD Website https://pdd.jk.gov.in/

Moreover, economic considerations have so far guided a preference for hydroelectricity over thermal power generation due to the high costs associated with importing coal, since Jammu and Kashmir is home to rivers with abundant untapped hydroelectric potential, and the region does not have any substantial coal reserves. Hydroelectric projects, which integrate electricity generation with irrigation, have been viewed as the most economically viable projects, with varying degrees of social and ecological costs. Globally, the push towards renewable energy and climate crisis of contemporary times have also allowed for transitioning away from simplistic economic considerations and in line with these developments, there has been a gradual increase in small hydro and solar power generation capacity in Jammu and Kashmir. The following pie chart (Figure 2), graphically illustrates the category-wise installed capacity in J&K and the preponderance of hydropower, as on 31st March 2024, based on data from the Central Electricity Authority (CEA), Ministry of Power, Government of India.

Figure 2 : Category wise Installed capacity of Jammu and Kashmir



*Source:* Report On Resource Adequacy Plan for the Union Territory of J&K and Ladakh, Central Electricity Authority (CEA), Ministry of Power, Government of India, 2024.

The per capita consumption of electrical energy in terms of Kilowatt hours (kWh) in Jammu and Kashmir was 1322 kWh for the year 2018-19 (Press Information Bureau, Government of India, 2019). To explore whether the gradual increase in electricity generation, electricity consumption per capita, and the increase in population in Jammu and Kashmir, are correlated or not, however, that is beyond the scope of this paper and might be an interesting entry point for future research. An analysis of year-wise energy generated in Jammu and Kashmir implies

over the last decade implies that, there has been a gradual increase in power generation in Jammu and Kashmir from around 3958 Million Units (MUs) in 2014-15 to around 5191 Million Units (MUs) in the year 2022-23. The trends in Gross energy generation in J&K (Figure 3) have been illustrated by the following graph (Figure 3), encapturing this gradual increase in gross generation in Million Units, year-wise, over the course of last decade.

Figure 3 : Year-wise Gross Generation (Million Units) from 2014-14 upto 2023-24 (November)



*Source:* Reply to part (b) of unstarred Question no. 1916 answered in the Rajya Sabha on 19.12.2023 https://sansad.in/getFile/annex/262/AU1916.pdf?source=pqars

## 3.1 Energy Deficit

Whereas the installed capacity has increased manifold over the years across India, and electrical networks have expanded spatially across regions as well, however, there still exist some regions where there is considerable energy deficit (i.e the difference between peak energy demand and the peak demand met) or in other words 'demand not met'. The information contained in the following Figure 4, graphically illustrates the Energy deficit percentage of States and UTs, to go beyond absolutist calculations and present a relativist scenario, according to official government data from the All India Electricity Statistics General Review 2022.



Figure 4: Energy Deficit Percentage of States and UTs

*Source:* All India Electricity Statistics General Review 2022 (Containing Data for the Year 2020-21). Government of India, Ministry of Power, Central Electricity Authority, New Delhi, May 2022

Jammu and Kashmir was a frontrunner in electricity generation in South Asia, possessing a 'first mover' advantage, and home to one of the first hydropower projects in South Asia i.e Mohra Powerhouse, which was inaugurated in 1908 (Abubakr and Bhaduri, 2023). However, in recent times the region has been a laggard, having an energy deficit percentage to the tune of around 18%, which is highest among all states and Union Territories of India, as has been illustrated in Figure 4 above.

In recent times, however, Government has claimed that there have been downward trends in energy deficit in Jammu and Kashmir over the course of last few years as is evident from the information contained in Figure 5 below.



## Figure 5 : Year-wise Energy Deficit percentage of Jammu and Kashmir

# *Source:* Reply To Part (C) Of Unstarred Question No. 1916 Answered In The Rajya Sabha On 19.12.2023 https://sansad.in/getFile/annex/262/AU1916.pdf?source=pqars

Another offshoot of energy deficit in Jammu and Kashmir is its negative impact on the fiscal sustainability of the state. Higher energy deficit leads to higher power expenditures in Jammu and Kashmir, which in turn results in fiscal sustainability because of the positive correlation between power sector spending and the gross fiscal deficit. Using data from the RBI Bulletins for 1990–91 to 2019–20, a study used this data to examine the correlation between gross fiscal deficit and electricity expenditure, and its findings showed that electricity expenditure and the state gross fiscal deficit in Jammu and Kashmir are positively correlated, suggesting that higher power expenditures are associated with less fiscal sustainability (Katoch, 2024).

# 4. Energy Policies at National Level

Energy policies in India since independence can be broadly classified chronologically into five phases, with each phase located in a temporal context, a backdrop of political economy factors and global imperitives (Bardhan et.al, 2019). The information contained in the following schematic (Figure 6) graphically illustrates these phases of evolution of energy policies in India since 1947.



Figure 6 : Phases of evolution of energy policies in India since 1947

*Source :* Bardhan, R., Debnath, R., & Jana, A. (2019). Evolution of sustainable energy policies in India since 1947: A review. Wiley interdisciplinary reviews: Energy and environment, 8(5), e340.

As is evident from the above schematic, Phase I (1947–1970) concentrated on supply adequacy with an overarching focus on infrastructure development as the cornerstone of the Indian economy. Phase II (the 1970s) saw a change in emphasis toward solving issues of energy access. For the sake of energy security, Phase III (the 1980s) focused on supply diversification, augmentation, and streamlining. The 1990s, or Phase IV, was when the focus shifted towards the modernisation of Indian electrical infrastructure. Lastly, Phase V since 2000s, includes contemporary times where energy policy is shaped by the current stage of market reforms and global imperatives to mitigate climate change.

The national energy policy landscape of India has undergone significant transformation since independence, reflecting changing national priorities and development challenges. The journey began with centralized approaches to build basic infrastructure, gradually shifting toward addressing rural energy access, then incorporating efficiency reforms, and more recently integrating sustainability concerns. This evolution shows how energy governance has responded to India's growing economy, technological possibilities, and social needs. Table.1 below captures this progression chronologically, listing key policy measures year wise along with their main objectives. It reveals how early supply-side interventions gradually made way for more comprehensive strategies that attempt to balance multiple goals - expanding access, improving reliability, and addressing environmental impacts while maintaining affordability. Each phase built on previous experiences while introducing new approaches to meet emerging challenges.

Year	Policy	Feature(s)
1948	The Electricity Supply Act	Created State Electricity Boards (SEBs) to manage power generation and distribution
1974	Minimum Needs Programme	Launched rural electrification as part of poverty alleviation efforts
1988	Kutir Jyoti Yojana	Provided single-point lighting to below-poverty-line rural households
1991	Electricity Supply Amendment Act	Opened power generation to private sector participation
1998	Electricity Regulatory	Established CERC and SERCs for tariff regulation

**Table 1:** Evolution of National Energy Policies of India

		Commissions Act	and sector oversight
	2001	Remote Village Electrification Programme	Used renewable energy for off-grid village electrification
	2001	Accelerated Power Development Programme (APDP)	Focused on improving power sector infrastructure
	2002	Accelerated Power Development and Reforms Programme (APDRP)	Expanded APDP with additional reforms for distribution
	2003	Accelerated Rural Electrification Programme	Boosted rural electrification efforts
	2003	Pradhan Mantri Gramodaya Yojana	Aimed to electrify un-electrified villages
	2003	The Electricity Act	Comprehensive legislation to reform and liberalize power sector
	2005	Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)	Targeted universal household electrification by 2012
	2005	National Electricity Policy	Framework for power sector development and rural electrification
	2006	National Tariff Policy	Guidelines for rational electricity pricing and subsidies
	2006	Rural Electrification Policy	Specific provisions for rural electrification implementation
	2008	Restructured APDRP (R- APDRP)	Strengthened distribution infrastructure with IT integration
	2014	Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)	Focused on rural electrification and feeder separation
	2015	Ujwal DISCOM Assurance Yojana (UDAY)	Scheme for financial turnaround of power distribution companies
ſ		Pradhan Mantri Sahaj Bijli Har Ghar Vojana (SAUBHAGVA)	Last-mile connectivity for universal household electrification
	2017		
	2017 2020	Electricity Amendment Act	Further reforms for competition and consumer choice

*Source:* Self compiled by the author

# 5. State Level Energy Polices of Jammu and Kashmir

The energy policy landscape of Jammu and Kashmir has evolved in response to the region's unique geographical constraints and developmental needs. Early initiatives focused on establishing basic regulatory frameworks, gradually shifting toward harnessing local renewable resources like hydro, solar, and wind power. More recent measures reflect attempts to balance energy security with sustainable development, particularly through decentralized solutions and private sector participation. The table below presents this chronological progression, listing key policy interventions year-wise along with their primary objectives. It demonstrates how the region's energy governance has adapted over time - from foundational electricity regulations to contemporary renewable energy strategies - while addressing both local

requirements and broader energy transitions. This trajectory highlights a growing emphasis on energy access, efficiency, and environmental considerations in the region's policy approach.

Year	Policy	Features
1940	Jammu and Kashmir Electricity Act	Established the legal framework for electricity regulation in the state
1963	Jammu and Kashmir Electricity (Duty) Act	Introduced levies on electricity consumption to generate state revenue
1989	Setting up of J&K Energy Development Agency	Created to promote renewable energy and rural electrification
2000	J&K State Electricity Regulatory Commission Act	Formed an independent regulator for tariff determination and sector oversight
2010	Jammu and Kashmir Electricity Act, 2010	Consolidated and modernized electricity laws, replacing older legislation
2011	J&K Energy Conservation Act	Mandated energy efficiency measures across sectors
2011	Policy for Micro/Mini Hydro Power Projects	Encouraged small-scale hydropower development for local energy needs
2013	Solar Power Policy	Promoted solar energy adoption through incentives and targets
2016	Rooftop Solar PV Policy (Net Metering)	Enabled grid-connected rooftop solar systems with net metering benefits
2019	J&K Reorganisation Act	Repealed the 2010 Electricity Act post-state reorganization into a Union Territory
2022	Bio-energy Policy	Focused on biomass and waste-to-energy projects for sustainable power
2022	Hydropower Policy	Aimed at harnessing the region's hydropower potential with private participation
2023	Wind Power Policy	Introduced frameworks for wind energy development in suitable zones

Table 2: Evolution of State/UT level Energy Policies of Jammu and Kashmir

*Source: Self compiled by the author* 

# 6. Rethinking Reforms for Equity and Sustainability:

This energy policy trajectory of India at the national level and of Jammu and Kashmir at the regional level has gradually changed from a supply-centric, state-dominated model to a hybrid paradigm that balances inclusive electrification, market processes, and the incorporation of renewable energy. However, ongoing issues—such as the DISCOMs' financial sustainability, fair energy transitions, and the conflict between centralized and decentralized systems indicate that Jammu and Kashmir's energy policy development is still an incomplete process Persistent conflicts between increasing access, maintaining financial viability, and promoting sustainability are revealed by exploring the evolution of energy policy in Jammu and Kashmir. Even though market processes and private participation have been prioritized in reforms since the 1990s, issues of equity, inefficiencies in the distribution sector, and the integration of renewable energy still need to be addressed. Similar to this, Jammu and Kashmir's energy trajectory shows efforts to take use of the region's renewable energy potential while battling financial limitations made worse by power sector spending. These experiences highlight the

need for reforms that specifically address fairness and sustainability as interrelated objectives, as techno-economic solutions alone are insufficient.

A revised strategy would acknowledge that energy transitions are highly political processes that call for institutional changes that strike a balance between inclusive governance and budgetary restraint. For example, when combined with community-centric approaches, localized renewable energy, as exemplified by J&K's rooftop solar and mini-hydro initiatives, could both improve access and ease financial burden. In order to democratize energy planning and make sure that climate obligations are in line with livelihood demands, national restructuring must go beyond tariff rationalization. Reforms run the risk of maintaining the erroneous division between equitable outcomes and economic efficiency in the absence of such systematic rethinking. Both national and J&K's policy trajectories demonstrate that polycentric governance, which empowers states and local players while acknowledging national and global imperitives, might be a possible solution.

When it comes to striking a balance between efficiency and equity, the drive for marketoriented reforms in Jammu and Kashmir's energy sector-prioritizing privatization, tariff rationalization, and competitive generation-has produced uneven outcomes. Although certain states have seen an improvement in operational performance as a result of these policies, their distributive effects are still up for debate, especially in areas like Jammu and Kashmir where fiscal constraints intersect with developmental deficits. The retreat of state provisioning in favor of market mechanisms has created new tensions between cost recovery imperatives and issues of equitable energy access. This raises critical questions about whether neoliberal frameworks have inadvertently deepened spatial inequalities in energy affordability and reliability. The Jammu and Kashmir experience illustrates how fiscal austerity measures interact with unique regional challenges, where heavy reliance on hydropower and transmission losses compound the equity impacts of reform. At the national level, the tension persists between renewable energy transitions driven by private investment and the unmet need for democratized energy planning. Examining these dynamics reveals a fundamental paradox: market-centric approaches may enhance sector efficiency while risking the marginalization of consumers, unless consciously coupled with institutional safeguards for distributive justice.

The persistence of unequal energy access and affordability across India reveals deeper structural imbalances in the governance of energy transitions. While urban centers and industrial consumers benefit from reliable supply and tariff protections, rural households and small commercial users—particularly in regions like Jammu and Kashmir—continue to face erratic access and regressive cost burdens. These disparities are compounded by environmental externalities, as coal-dependent generation and large hydropower projects displace communities and degrade local ecosystems without commensurate benefit-sharing. Governance challenges further exacerbate these inequities. Weak regulatory oversight, coupled with fragmented policy implementation, allows inefficiencies in distribution systems to coexist with unfulfilled renewable energy promises. The result is a dual exclusion—where marginalized populations bear both the costs of energy poverty and the ecological consequences of centralized energy expansion. Addressing this requires moving beyond technical fixes to confront the political economy of energy planning, ensuring that sustainability transitions do not reproduce historical patterns of spatial and social disadvantage.

# 7. Conclusion and Policy Implications

India's energy policy evolution—from centralized state-led expansion to market-driven reforms—has made progress on energy access, yet persistent gaps in affordability and reliability reveal unresolved tensions between efficiency and equity. Jammu and Kashmir's experience illustrates these contradictions starkly, where fiscal constraints, energy deficits, and

governance challenges intersect with the region's renewable potential. Energy reliability is another key concern, because despite a plethora of policies, plans and programs dedicated to address this issue, the average power cuts in the state of Jammu and Kashmir still continue to be a norm, especially in the winter months. According to Government data, on average there were 3 to 5 hours of power cuts in Jammu and Kashmir for the months of December 2022, January 2023, and February 2023, that too in metered areas. While national policies have increasingly emphasized sustainability, distributional inequities remain entrenched, with energy poverty and issues of energy reliability disproportionately affecting marginalized communities.

Three key policy implications emerge: First, energy transitions must integrate decentralized renewable solutions with financial mechanisms that protect vulnerable consumers. Second, governance reforms should strengthen regulatory accountability to balance cost recovery with equitable service delivery. Finally, Jammu and Kashmir's hydropower and solar potential must be harnessed through participatory planning that links energy access to local development. Without such systemic rethinking, the region's energy future risks replicating the very inequalities it seeks to resolve.

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