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www.sais-isep.org
@sais_isep

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A REGIONAL POLICY PERSPECTIVE ON ENERGY TRANSITION BOLSTERING RENEWABLE ENERGY IN JHARKHAND: CHALLENGES, OPPORTUNITIES & POSSIBLE SOLUTIONS

Amit Kumar, Willy Brandt School of Public Policy, University of Erfurt

This brief elaborates on the challenges faced by the coal-dependent Indian state of Jharkhand in clean energy transition. The transition to a sustainable energy system creates institutional, social, infrastructural, and financial challenges. The brief recommends adopting renewable energy policy to stimulate sustainable energy transition in the state.

Source: Bhandari, (2015); Kendrick, (2013)

INTRODUCTION

Jharkhand, a relatively new state in Eastern India, was formed in the year 2000. It is endowed with an enormous potential for utilizing and adopting renewable energy (RE) owing to its abundant solar insolation (CEED, 2018). As per the Ministry of New and Renewable Energy (MNRE), the state potential of a cumulative solar power generation capacity is 18.18 GW (Deloitte, 2015). However, renewable energy accounts for a very small share of Jharkhand's total electricity production.

The state has an installed total capacity 2.5 GW out of which only 1.8% comes from Renewable Energy Sources (RES). Renewable sources have contributed only 0.07% in the total Jharkhand's electricity generation in 2019-20 (CEEW and CEF, 2020). This strongly points towards major obstacles in transitioning from existing coal-based electricity systems to renewable electricity systems.

Switching over to a higher proportion of electricity being generated by renewable sources would be highly beneficial for the state. It would help in reducing dependency on fossil fuel energy, in reducing carbon emission, creating employment in the renewable energy sector, developing the economy, and ensuring energy security. On the other hand, it will reduce employment in the coal sector, contribute towards decreasing state revenue, and will lead to the state not having sufficient backup power during peak RE hours.

This policy brief reviews four key challenges that hinder energy transition in the state: (1) reliance on coal for economic growth, energy generation and employment; (2) indifference from the implementing agency and poor institutional capacity; (3) inability to balance peak energy demand through renewable sources; and (4) lack of investment and infrastructure. Further, this policy brief recommends possible policy solutions to tackle these challenges.

HARNESSING POTENTIAL OF RENEWABLE SOURCES

With increasing maturity of renewable technologies, decreasing costs and considering environmental challenges, renewable sources can play a crucial role in Jharkhand. As seen in Figure 1, Jharkhand has, in total, installed and allocated power capacity 2.5 GW out of which only 47 MW comes from renewable energy (as of January 2020; CEEW and CEF, 2020). The state has a huge potential for renewable energy sources, especially solar. The solar insolation is about 300 days of clear sun and the potential of daily radiation is in the range 4.5 to 5.5 kWh/Sqm (Government of Jharkhand, 2015).

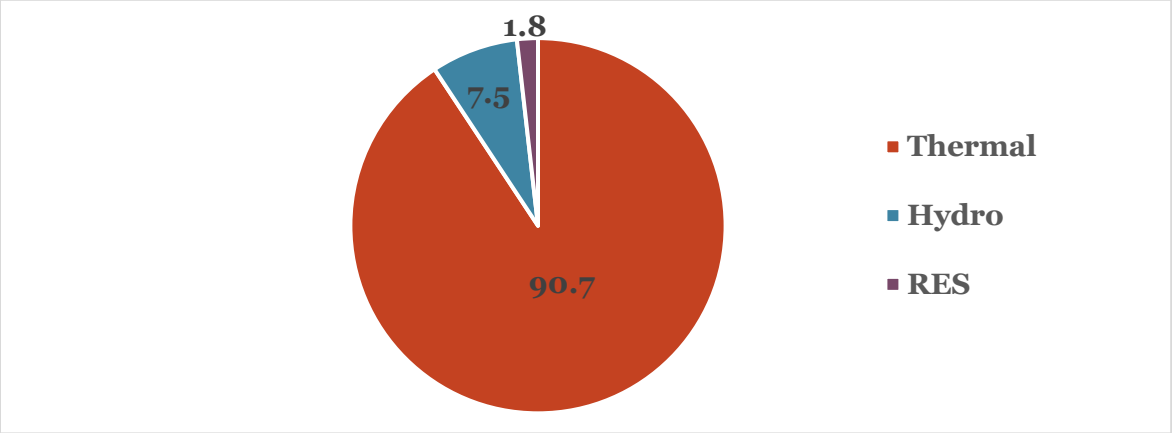

Figure 1: Total installed and allocated power capacity (MW) 2019-20, January
Source: CEEW and CEF (2020)

As per a study by the Center for Environment and Energy Development (CEED), the solar rooftop potential is over 1 GW of the two largest cities in the state, Ranchi and Jamshedpur (CEED,2018). The report indicates that it requires massive investment (around INR 152 billion/ $2 billion) in these cities to attain the solar rooftop policy target of 500 MW in the next two years. In addition, this will create 24,000 jobs in these two cities (CEED,2018).

This report also suggests that adding the untapped solar rooftop potential of other cities can meet the energy demand of the state, secure energy security, and make Jharkhand an energy surplus state without relying on fossil fuels. Solar energy can provide 100% household electrification in remote areas where grid connectivity is non-existent. However, the state has multiple challenges for harnessing RES in the state. Therefore, Jharkhand requires pragmatic solutions for a smooth transition and effective guidelines to accomplish the targets for the smooth energy transition in the state.

CHALLENGES FOR ENERGY TRANSITION

The state faces four important challenges for accomplishing the goal of clean energy:

3.1 Reliance on coal for economic growth, energy generation, and employment

In the year 2017-18, Jharkhand contributed 18% of total provisional coal production in the country which made it the third-largest coal producer in India (Aklin et al., 2020). Moreover, coal is evidently pivotal to the state economy. Table 1 indicates the contribution of the top six coal-producing states to the monetary value of coal output in India. In the case of Jharkhand, the contribution of coal is an estimated 10% of the state's GDP; coal acts as the backbone of the state's economic growth and revenue generation.

Further, coal production is concentrated in certain districts within Jharkhand and provides for relatively higher wages in these districts (Spencer et al.,2018). Due to the abundance of coal, Jharkhand has fulfilled energy requirements mainly from conventional energy sources such as coal, which contributes to over 90% of the state's energy production. Therefore, there stands a risk that the economy and livelihoods of people will collapse, and this risk results in a large level of paralysis in the state. This paralysis has proven to be a major impediment in the transition to renewable energy sources.

The coal sector is significant in terms of employment, both in the formal and informal sectors of the state. Around 2.3% of the population is dependent on coal in the formal sector (Nandan & Blankenship, 2019). In addition, a significant proportion of the population is employed by the informal mining sector (Lahri-Dutt, 2003), that includes contractual jobs such as loading and unloading, selling coal in nearby markets, transportation of coal, etc.

An ISEP study reveals that the coal sector provides direct employment to 1% of the rural population in 14 districts of Jharkhand and within this number, 4% of the workforce belongs to the tribal communities (Aklin et al. 2020). Further, the land is not suitable for farming activities in the mining areas and people have limited skills (Nandan & Blankenship, 2019). As a consequence, this poses a significant challenge in the transition from coal to renewable energy. Further, this can also exacerbate already existing political tensions regarding employment opportunities.

Table 1: Importance of Coal to the State Economy

State	State share in the all-India value of coal output (A) (%)	Share of coal in the total value of the state's mining sector (B) (%)	Share of state's mining sector value in state's GDP (C) (%)	Estimated share of coal mining value in the state's GDP (D=B*C)
Jharkhand	**22**	**91**	**11**	**10**
Madhya Pradesh	16	78	4	3
Chhattisgarh	15	66	13	9
Andhra Pradesh	13	43	4	2
Odisha	11	38	12	4
Maharashtra	10	83	5	4

Source: Spencer et al. (2018).

3.2 Implementing agency indifference and poor institutional capacity

The second problem is related to the implementation of renewable projects. The Jharkhand Renewable Energy Development Agency (JREDA) is the nodal agency for the promotion and implementation of Renewable Energy Sources (RES) in the state that works under the Department of Energy and Government of Jharkhand. The performance of JREDA has not been very satisfactory in implementing RES projects in the state. Figure 2 indicates the year-wise installation of RES as compared to the thermal energy deployment in Jharkhand. This reveals the JREDA has failed to boost renewable energy installation in the state.

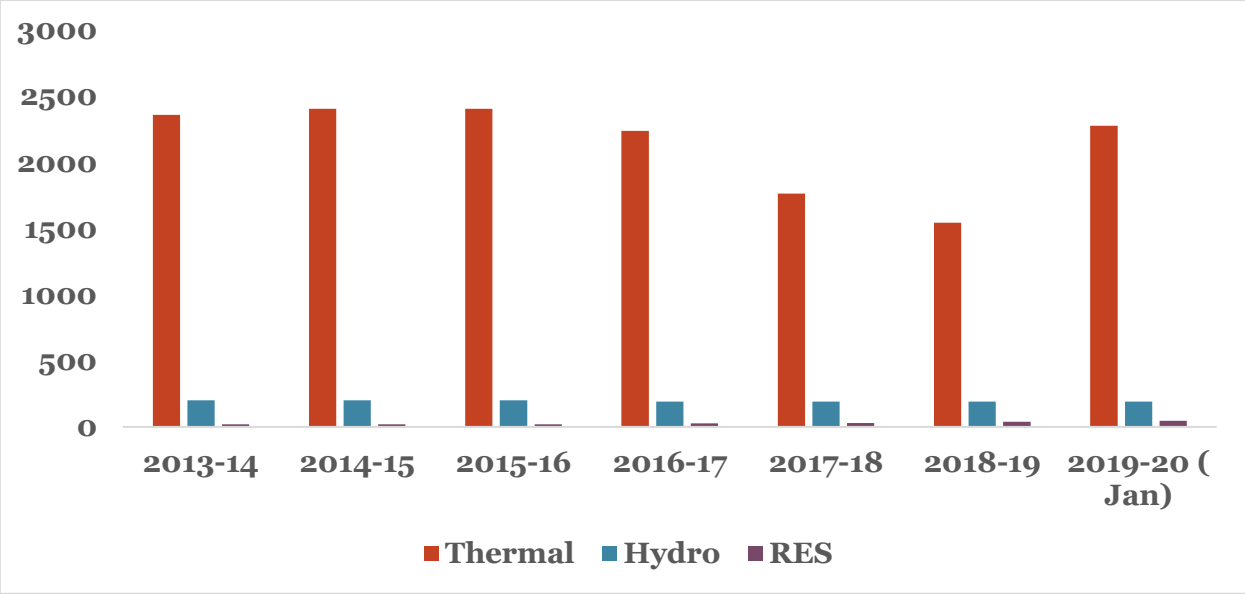

Figure 2: Total installed and allocated renewable energy vs. thermal power capacity (MW)
Source: CEEW and CEF (2020)

As per Mercom's India solar project tracker, the state auctioned 1.1 GW of grid-connected solar photovoltaic (PV) projects in March 2016. Further, the state signed Letters of Intent for 1.1 GW of capacity development (Prateek, 2018). However, at the end of the financial year 2016-17, there were no finalized Power Purchase Agreements (PPAs). Further, the state has re-negotiated tariffs with the developers and has reduced the planned project capacities. Thus, it resulted in delayed implementation of multiple renewable projects in the state by the nodal agency.

As of January 2020, a capacity of only 47 MW has been installed from renewable energy sources (CEEW and CEF, 2020). Further, Jharkhand faces poor institutional capacity. The state government has failed to meet the Renewable Purchase Obligation (RPO) targets in the state from the financial year 2010-2011 till 2017-18 (Ranjan, 2020).

RPO is one of the most crucial policies driving renewable energy installation mechanisms in the state. It refers to the obligation to purchase a minimum level of renewable energy out of total consumption by the obliged entity (JSERC, 2020,). However, the JREDA failed to accomplish renewable targets due to weak institutional capacity, poor monitoring mechanisms and slower renewable deployments in the state (Bijlani, 2019).

3.3 Inability to balance peak energy demand through renewable sources

Renewable energy generation varies during the month and across the season. Because of this, it becomes necessary to secure an alternative source such as coal, gas, etc. This will be crucial to meet energy demand during the peak demand hours when renewable output is potentially not

adequate. In case of Jharkhand, the installed capacity of hydro power is 191 MW which is 7.6% of total capacity of state (CEEW and CEF, 2020). There is no installed gas capacity in the state.

It raises questions regarding how the state will manage energy demands with low renewable output during the peak hours. Therefore, the state has to rely on fossil fuels for balancing generation during high demand. This poses a significant challenge of state ability to decrease dependency on coal.

3.4 Infrastructure and Financing

Another pertinent challenge exists regarding the infrastructure and investment in the energy transition in Jharkhand. Jharkhand implemented two commendable solar policies: Jharkhand Solar Power Policy, 2015, and Jharkhand Solar Rooftop Power Policy, 2018 (Government of Jharkhand, 2015; Government of Jharkhand, 2018).

Despite this, the state has installed only solar capacity of 16.19 MW in 2015-16 to 39 MW till January 2020 and ranked 20th out of 28 states in the country as per installed solar capacity (CEEW and CEF, 2020). The state share has only 0.05% of electricity generated from solar in India in 2018-19 (CEEW and CEF, 2020). This reveals the speed of deployment of solar technology is quite slow because of poor investment and infrastructure.

A new report by the ISEP shows that despite the universal access of electricity, the intermittent supply of power in Jharkhand and households generally depend on backup lighting fuel such as kerosene. In such a scenario, renewable energy such as solar lamps can play an important role to provide a more efficient and cleaner alternative energy.

However, the state lacks infrastructure capacity in terms of smart grid, metering, billing, and collection (Aklin et al., 2020). For example, as per a survey done by the Initiative for Sustainable Energy Policy (ISEP), around 70% of respondents do not have an electricity meter or have one meter but do not receive an electricity bill (Aklin et al., 2020). In this case, the investor will not be assured to secure a return in its investment. It hinders investment opportunities of renewable energy in the region. Further, the inaccuracy of tariff collection of renewable energy will lead to decrease in profit sharing. Finally, lack of smart metering in the state jeopardizes growth and development of renewable energy in Jharkhand.

The points specified above illustrate the multi-dimensional challenges that Jharkhand faces while undertaking a large-scale transition to low-carbon energy sources. Consequently, it proves to be a major hindrance in the transition of the state's energy system to a low carbon-based energy system. The breadth of these problems covers not only socio-economic issues but also infrastructure and development problems, thus making addressing these challenges difficult.

POLICY RECOMMENDATIONS

- **Diversify the economy to reduce dependency on coal:** Diversification means that the state should not only promote positively toward the fossil fuel-based industry rather focus on coal-based investment, subsidy and human capital should be carefully reconsidered. The government should diversify the economy and gradually reduce reliance on fossil fuel revenue sources.

- **Accountability of JREDA & Institutional capacity building:** There should be fixed accountability of JREDA for in time completion of the projects. The MNRE or state government should closely monitor the performance of implementing agencies for accomplishing renewable projects on time. In addition, the Department of Energy needs to enhance the budgetary allocation for JREDA. Manpower should be available adequately to implement renewable projects in the state.

  The state and local level capacity building and skill up-gradation should be provided to monitor these projects effectively. In addition, the state has already implemented the Jharkhand Skill Initiative scheme in 2011. The nodal agency department of labor, employment and training should provide skill development training to the informal laborers in mining areas. The training should focus on matching skills for renewable-based jobs in the coal regions.

- **Creation of alternative job opportunities:** The state government has implemented policies bolstering renewable energy but the policymakers have fallen short in terms of addressing the issue of coal-dependent workers that makes the energy transition quite challenging. The mining districts have an existing financial mechanism called as the District Mineral Fund (Banerjee and Ranjan, 2018). The fund is essentially designed for the mining-affected workers considering their needs of job creation, poverty and inequality reduction. There is a need for transparency and adequate monitoring mechanisms for the effective utilization of funds in the mining areas.

  Further, the government through its MNREGA scheme guarantees employment for rural workers, however, the daily average wage ensured is INR 171 which is even lower than that of coal workers who earn INR 370 per day (Aklin et al., 2020). The priority should be given to securing employment for the coal workers in the mining districts. Taking cognizance of this, the measures should be in place to enhance coal workers' income linkage with state-sponsored need-based agriculture and allied activities such as integrated farming systems, cottage industries, animal industries, etc. in the affected areas.

- **Public private partnership-based RESCO Model for investment**: In Fiji, where the first Renewable Energy Service Company (RESCO) model was implemented, the objective was to expand solar-based "rural electrification in a fee-for-service model"

aiming to reduce the cost of solar energy and providing service at a public-private partnership model (Dornan, 2011). On a similar note, the Jharkhand Government has mentioned the implementation of Solar Rooftop Policy, 2018 based on the RESCO model. There is a need to expedite the implementation of this model based on slight modification in the state. The incentives of the stakeholders should be aligned with operations at household level that will minimize the principal-agent and motivational problems. The PPP based RESCO model should augment the investment in renewable energy, reduce technical barriers and promote the third-party investment.

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sais-isep@jhu.edu
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