



EXECUTIVE SUMMARY

# RE-POWERING JHARKHAND

Assessment of the solar  
rooftop potential of  
Ranchi and Jamshedpur



# EXECUTIVE SUMMARY

*Jharkhand is one of the richest states in terms of mineral resources and has been the power hub of the country for several years. The region has a plethora of natural deposits of iron ore, mica, and coal. Despite that, the state has been lagging in terms of overall development, which is largely attributed to its separation from Bihar in 2000.*

*The National Ambient Monitoring Programme (NAMP) which collects data on key air pollutants in various cities of India shows that pollution is increasing at an alarming level in Ranchi and Jamshedpur and the residents of these cities are facing severe consequences.*

The newly formed state had a paltry 1400 MW power plant which translates to 20 W per capita against the national average of 100 W per capita. Nevertheless, strong efforts from Government of Jharkhand in the last ten years has increased the total installed capacity of the state to 2590 MW. With accelerated efforts aimed at reforming the power sector and bringing electricity to all the villages in the state, Government of Jharkhand has formulated numerous policies and taken various measures to accomplish this feat. In recent years, infrastructure and social development of Jharkhand have gained pace resulting in the improvement of its development indicators. However, various parameters, like the level of urbanization which is still 24.05% against the national average of 31.15%, are still unsatisfactorily low. The proportion of people living below the poverty line is 40.8% against the national average of 25.7%. Like any other state in the country, Jharkhand is also fast growing in terms of both economy and population. This hunger for the growth of this state is in need of reliable electricity supply along with increased self-sufficiency with low carbon technologies like solar energy and other renewable energy technologies.

Power generation in Jharkhand has been steadily increasing in the last decade with new investments in both generation and transmission sectors. Its total energy generation was 1762.06 MW as of 28th February 2018 (1). Out of this, renewable energy (solar) accounts for 27.32 MW which is only about a 1.55% share in the generation mix. Hydroelectric power with an installed capacity of 191 MW accounts for about 10% of the generation mix. This reflects that the state is currently heavily reliant on fossil fuel-based generation which accounts for nearly 90% of its generation mix. Although it has huge potential for power generation, currently 54% (2) of the households are yet to be connected to the grid.

Per capita energy consumption of Jharkhand is 552 kWh against the national average of 1075 kWh in FY 2015-16, putting it amongst the lowest per capita energy consuming states of India. However, Jharkhand has been improving year after year and setting an example of good governance and development in the energy sector for other states. The actual energy deficit in Jharkhand has reduced from 2.3 % in FY 2015-16 to merely 0.7% in FY 2016-17h.

Deteriorating air quality is another serious concern in Jharkhand as air pollution in cities like Ranchi and Jamshedpur has been on a consistent rise over the past couple of years. The ambient air quality data for 2016 highlights the severity of the situation in both the cities. In 2016, the annual average concentration of PM10 in Ranchi was 196  $\mu\text{g}/\text{m}^3$  which is 3.2 times higher than its national permissible limit and 9.8 times higher than WHO safe limits, whereas that of SO<sub>2</sub> and NO<sub>2</sub> was within the national permissible limits. The national standards for NO<sub>2</sub>, SO<sub>2</sub>, and PM10 concentration are 40  $\mu\text{g}/\text{m}^3$ , 50  $\mu\text{g}/\text{m}^3$  and 60  $\mu\text{g}/\text{m}^3$  respectively, whereas the WHO permissible limits for PM10, NO<sub>2</sub> and SO<sub>2</sub> are 20  $\mu\text{g}/\text{m}^3$ , 40  $\mu\text{g}/\text{m}^3$  and 20  $\mu\text{g}/\text{m}^3$  respectively. The annual average

1 [http://www.cea.nic.in/reports/monthly/installedcapacity/2018/installed\\_capacity-02.pdf](http://www.cea.nic.in/reports/monthly/installedcapacity/2018/installed_capacity-02.pdf)

2 <http://saubhagya.gov.in/>

*This report prepared by CEED in collaboration with Jharkhand Renewable Energy Development Agency (JREDA) and Central University of Jharkhand (CUJ) finds that the city of Ranchi has about 9.2 sq. km of viable rooftop space, while Jamshedpur has about 6.9 sq. km of viable rooftop space for installing solar panels.*

value for PM10 in Jamshedpur for the year 2016 was 137  $\mu\text{g}/\text{m}^3$  which is 2.2 times higher than the national permissible limit and 6.75 times higher than the WHO limit.

India's solar ambitions of installing 100 GW by 2020 has put the energy sector in a positive drive for new investments and regulatory changes. The state of Jharkhand with its Solar Energy Policy 2017 is no longer a stranger to solar energy. It has set a target of 2650 MW by 2020 in a phase-wise manner with a rooftop specific target of 500 MW. These targets are critical for addressing the energy woes of the state as well as curbing air pollution. This report studies the solar rooftop potential of the two major cities in the state and analyses various business models that can benefit its consumers, developers, and utilities. Ranchi, the capital of Jharkhand, and Jamshedpur, the nerve of Jharkhand's economy, are the two most populated cities and the power centers of the state. These two cities, with good infrastructure in terms of both housing and transmission, make this study more feasible.

This space can accommodate a total of 667 MW and 495 MW of rooftop solar respectively, which is a total of 1,162 MW of solar power in just these two cities. As per the net metering guideline of the state, the rooftop system installation is capped at 20% of the peak power demand. Taking this into consideration, these cities can install 100 MW and 62 MW solar rooftop systems respectively by 2022. With further improvements in the grid infrastructure, the potential of 1162 MW can be achieved by 2025. This report suggests that the RESCO model is the most suitable model for Government buildings and commercial spaces as it reduces the risk for the roof owner and brings investment opportunities to the state. For the residential sector, the community ownership model giving good flexibility to high rise buildings and people living in residential societies is the most beneficial model. The report also includes a case study for solar rooftop installation on Bishop Westcott Boys' School in Ranchi and a police station in Lalpur to showcase the potential in these types of buildings and the generation capacity over the years, along with shading analysis.

This potential over time will help Jharkhand to take a giant leap towards the path of sustainability and clean air, thereby reducing its dependence on fossil fuels and making it a key player in India's climate change commitments.