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WIND ENERGY IN ODISHA

Investment Potential

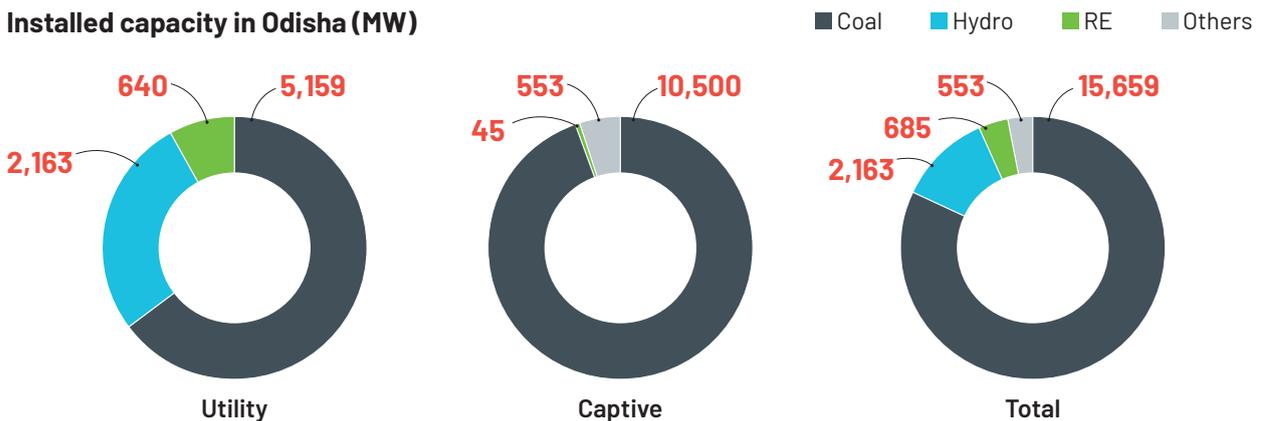
November 2023



Renewable Energy in Odisha

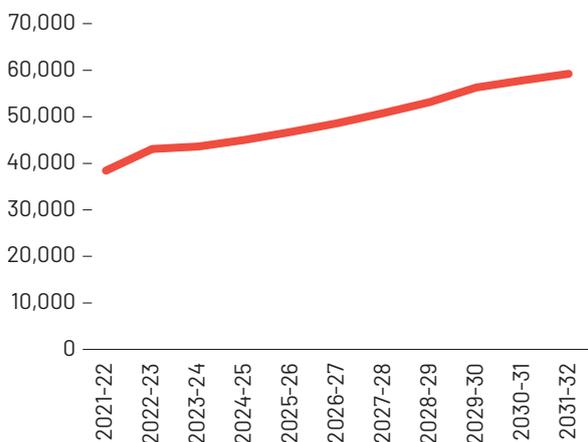
- Renewable energy presently accounts for a small share of Odisha’s installed capacity. Of the 19 GW of capacity installed in the state, across utility and captive domains, 82% is based on coal, 11% on hydro, 4% on renewable energy, and the remaining 3% on others.
- The dominant role of coal is driven by the state’s abundant local reserves – Odisha is the second-largest producer and the fourth-largest consumer of coal in India. Odisha’s coal presently fuels about a quarter of the country’s total coal-based power generation.
- As power demand expands further, the state has now stated a clear commitment towards renewable energy growth driven by the dual considerations of prioritizing climate change mitigation action and stimulating green growth.
- In December 2022, Odisha adopted the Odisha Renewable Energy Policy, 2022 (OREP 2022) with a clear ambition and objective of ushering in an energy transition in the state, providing a comprehensive set of incentives to developers and industry to stimulate investments in the state.
- The policy identifies a requirement of setting up 21.7 GW of renewable energy capacity for meeting new renewable purchase obligation (RPO) of 43.33% by 2029-30, including 5.7 GW in utility and 16 GW in captive sectors.

Installed capacity in Odisha (MW)



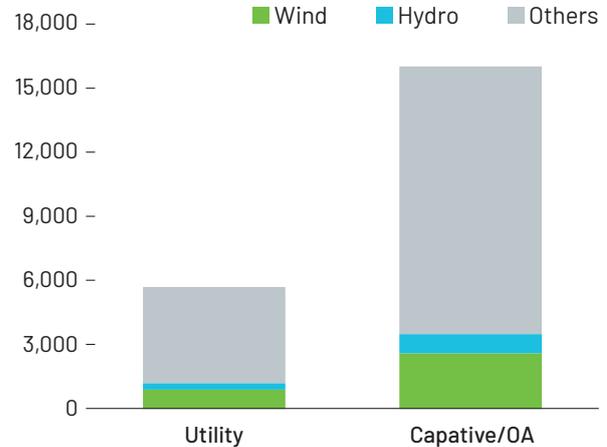
Note: Data for utility capacity as of September 2023, and for captive capacity as of March 2022. Others include oil and gas-based power, cogeneration plants, and waste heat plants.
Source: CEA, Odisha Economic Survey.

Projected electrical energy requirement of Odisha (MUs)



Source: Twentieth Electric Power Survey of India 2022, CEA

Projected RE capacity addition requirement by 2030 (MW)



Source: Odisha Renewable Energy Policy, 2022



Renewable Energy Potential

- Odisha experiences average radiation of 5.5 kWh per square meter, average insolation of 390 W per sq m, and peak insolation of 900 W per sq m. The peak insolation is comparable to Gujarat, while the average is comparable to Karnataka.
- iFOREST estimates the ground-mounted solar potential of Odisha to be about 149 GW across 2,973 sq km of wasteland, based on utilization rates of 10 to 50% across five key wasteland categories – open scrub, mining wasteland, industrial wasteland, dense scrub, and rocky/stony land. Around 68% of this is in 13 southern and eastern districts.
- Odisha's total solar rooftop potential is estimated at 1,133 MW, based on roof area data sourced from Odisha Space Applications Centre (ORSAC). Khordha district accounts for the highest potential, followed by Baleswar and Jagatsinghpur.
- The floating solar capacity potential of the state is estimated to be 6.7 GW across 125 existing reservoirs under a conservative scenario, and 18.7 GW under a high utilization scenario. Rengali and Hirakund reservoirs are assessed to have the highest potential of 3.7 GW each, followed by Upper Indravati and Balimela at over 1 GW each.
- Around 256 MW of canal-top solar capacity can further be developed along its 410 km long network of concrete-lined irrigation projects. This would increase further as the line length is targeted to increase to 535 km.
- For wind project development, around 86 locations have been identified with an average wind speed ranging from 6.19 m/s to 8.78 m/s at 150m hub height across 16 districts, based on the Global Wind Atlas. Nearly 65% of the identified locations are in Koraput, Kalahandi, Angul, Rayagada, Gajapati, and Kandhamal.
- The cumulative biomass potential for Odisha is assessed to be around 3.4 GW based on updated district-wise crop residue surplus data at the 'ISRO JAIVOORJA' portal. Bargarh district leads in terms of gross and surplus biomass generation, followed by Kalahandi and Baleswar districts.

Wind Energy Potential Sites

- According to National Institute of Wind Energy (NIWE), around 8,346 MW of wind capacity can be installed in Odisha at 120 m agl, and 12,129 MW at 150 m agl. Majority of this potential is available at cultivable lands and wastelands.
- iFOREST's assessment of publicly available wind resource maps available at the Global Wind Atlas (GWA 3.1) has identified 86 sites reporting average wind speeds of 6.19 m/s to 8.78 m/s at 150 m hub height. These are located across 16 districts, with nearly 65% of the sites in Koraput, Kalahandi, Angul, Rayagada, Gajapati and Kandhamal.
- Detailed assessment of 16 highest potential sites with wind speed of 7.6-8.6 m/s at 150m hub height, which can generate CUF of 22% to 29%, shows that these are mostly located on hilly terrains with average elevation of 968 m, and highest elevation of 1,410 m. The peak wind speed months at these sites are April to September, which aligns with the peak demand months of July to September in Odisha. The peak wind speed hours typically start in the evening till after midnight, which aligns with the state's evening peak from 1800 hours to 2100 hours.

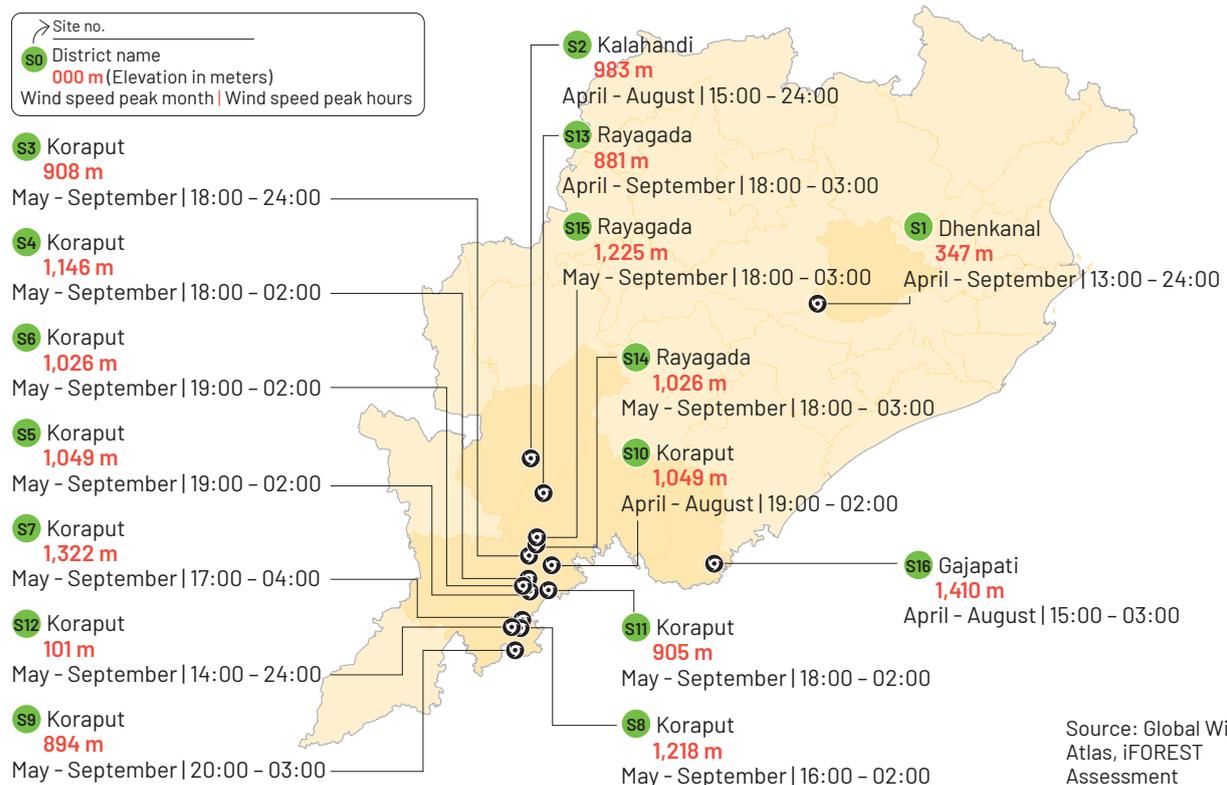
iFOREST identified high wind speed locations at 150 m agl across 16 districts

District	Angul	Baleswar	Boudh	Dhenkanal	Gajapati	Ganjam	Jajpur	Kalahandi
6-7 (m/s)	6	2	4				1	1
7-8 (m/s)	3	2	1	1	7	3	3	7
>8 (m/s)					1			

District	Kandhamal	Khordha	Koraput	Malkangiri	Nawarangpur	Nayagarh	Rayagada	Sambalpur
6-7 (m/s)	5	5		1	3		2	1
7-8 (m/s)	2		4		2	2	3	
>8 (m/s)			9				3	

Source: Odisha renewable energy potential re-assessment, 2023, iFOREST

iFOREST assessed location of leading high wind speed sites



Source: Odisha renewable energy potential re-assessment, 2023, iFOREST

Policy Support for Wind IPPs

To support the growth of wind energy and other renewable energy capacities within the state, the OREP 2022 provides a clear set of incentives and frameworks highlighted below:

Allotment on a First Come First Serve Basis:

- Wind power plant projects will be allotted by the nodal agency on a 'first come first serve' basis.
- Public and private sector entities can be allocated up to 50 MW capacity each, cumulatively up to 500 MW.

Guaranteed Sale of Power:

- OERC to set a generic feed-in-tariff (FiT) for wind projects commissioned before March 31, 2028; and GRIDCO will initially procure the entire power (up to 500 MW) from these projects at the OERC-determined generic FiT.

Mode of Operation:

- All wind projects are to be developed through the Build-Own-Operate (BOO) model for 30 years, which covers development, construction, PPA, and decommissioning.

Electricity Duty Exemption:

- A 50 paisa per unit electricity duty exemption is provided for captive/open access consumers using energy from in-state renewable energy projects.
- This is applicable for 15 years from project commissioning and is extended to 20 years for projects commissioned before March 31, 2026.

Energy Storage Projects Exemption:

- Energy storage projects, sourcing power from renewable projects located in the state, are exempted from electricity duty on input energy at 50 paise per unit for 15 years from the date of commissioning.

Cross-Subsidy Surcharge Exemption:

- A 50% exemption has been provided for open-access consumers using energy from Odisha-based renewable energy projects for 15 years.

STU Charges Exemption:

- A 20 paisa per unit exemption is provided on state transition utility (STU) charges for 15 years for captive/open access consumers using energy from in-state renewable energy projects. This is extended for 20 years for projects commissioned before March 31, 2026.

Wheeling Charges Exemption:

- A 25% exemption is provided on wheeling charges for captive/open access consumers using energy from Odisha-based renewable energy projects for 15 years.

Stamp Duty and Land Charges Exemption:

- RE projects are exempted from stamp duty on land purchase/lease, land conversion charges, and registration charges.

Connectivity with STU:

- Renewable energy projects are permitted to connect with STU.
- Grant of connectivity approval is to be provided by Transco within 15 days from document submission.

Environmental Clearance Exemption:

- Wind projects are exempt from state pollution control board clearances.

Renewable energy fund:

- A renewable energy fund is proposed to be set up to provide viability gap funding (VGF) for on-grid RE projects involving innovative technologies and battery energy storage systems projects, build power evacuation infrastructure, and provide special incentives for round-the-clock/hybrid RE projects.

Incentives for Equipment Manufacturing

The **Industrial Policy Resolution (IPR)** of 2022 recognizes wind energy equipment as a “thrust sector” for Odisha. This designation entails the provision of various incentives to attract investors interested in establishing manufacturing facilities in the region.

Land Incentives:

- Government land is to be alienated and transferred to IDCO at prices ranging from ₹1 lakh to ₹125 lakhs per acre (across identified zones). Exemption of 50% on the concessional industrial rate is provided for creating direct employment to 1000+ state-domiciled people.
- Exemptions are provided on stamp duty for the transfer of land, loan agreements, credit deeds, mortgages, and transfer of conveyance instruments to new owners.

Power:

- A 100% exemption is provided from payment of electricity duty for 10 years.
- Reimbursement of ₹2 per unit is allowed on consumption for power purchased from local discom for 10 years.
- A 100% exemption of cross-subsidy surcharges, additional surcharges, and STU charges for procuring power from state-based renewable energy plants/GRIDCO provided for 10 years.

Special Incentives (Captive Renewable Energy Plants):

- A 30% capital investment subsidy provided on actual investment in plant and machinery (excluding the cost of land and building) – disbursed in a phased manner for 5 years at 6% of overall eligible investment per year.

SGST Reimbursement:

- Reimbursement of 100% of net SGST limited to 200% of the cost of plant and machinery provided.

Employment Subsidy:

- A 100% reimbursement of employers’ contribution to ESI and EPF scheme provided for 7 years.

Innovation and R&D:

- A 50% assistance on R&D investments up to the maximum of ₹10 crores provided to academia and R&D Institutions.



Investment Risk Assessment

There are a number of risks typically associated with wind energy investments – including market, operational, climatic, policy risks etc. In case of Odisha, the OREP 2022 has tried to provide the right set of incentives to address and mitigate these.

Assessment of key risk categories for wind investment in Odisha

Risk Category	Mitigation Support
Market Risks: Fluctuations in energy demand, power pricing, and market competition.	Guaranteed Power Purchase: The Odisha government offers guaranteed power purchase agreements under the OREP 2022, ensuring consistent revenue streams for investors.
Project Risks: Technical issues, grid connectivity challenges, and project development delays.	Single-Window Clearance: The OREP 2022 streamlines approval processes, providing investors with a more efficient and predictable project implementation process.
Policy & Regulatory Risks: Changes in government policies and regulations.	Policy Stability: The Odisha government offers policy stability, ensuring that regulatory changes are minimized and providing a consistent regulatory environment for investors.
Financial Risks: Capital requirements, financing costs, and return on investment.	Financial Incentives: The OREP 2022 provides various financial incentives, including exemptions on electricity duty, STU charges, and more, reducing financial burdens and enhancing RoI.
Environmental Clearance Risks: Impact on local ecosystems and environmental compliance.	Environmental Exemptions: Renewable energy projects are exempted from requiring clearances from the State Pollution Control Board, simplifying environmental compliance.
Resource Risks: Variability in wind resources affecting energy generation.	Wind Potential Assessments: Data from NIWE India's Wind Potential Atlas and iFOREST's assessments help in precise site selection, mitigating resource-related risks along with strong technical assessment.
Cyclone Risks: Cyclones pose operational and infrastructure risks.	Vulnerability Atlas: Odisha's Vulnerability Atlas, published by BMTPC, reveals that less than 40% of the state is in high-risk zones. This information aids in site selection, reducing cyclone-related risks for projects.
Manufacturing Risks: Risks associated with setting up wind equipment manufacturing facilities.	IPR 2022: The Industrial Policy Resolution 2022 recognizes wind energy equipment as a "thrust sector" and offers various incentives and support for investors willing to establish manufacturing facilities in Odisha.

MESSAGE FOR INVESTORS

The time for wind energy investments in Odisha has arrived. With supportive policies, vast unexplored wind energy potential, and a commitment to sustainability, Odisha offers a promising landscape for investments.

- **Wind Potential:** Data from NIWE India's Wind Potential Atlas and iFOREST assessment highlight significant wind energy potential at various hub heights.
- **Policy Support:** OREP 2022 and IPR 2022 offer best in class incentives, including feed-in tariffs, and guaranteed power purchase, making it favorable for wind energy investments.
- **Risk Perception:** Challenging the perception of risk due to cyclones, less than 40% of the state is in high-risk zones. Majority of the high wind potential sites do not fall in these regions.
- **Investment Perspective:** Securing the investment environment and realizing demand can lead to successful investments.
- **Promising Destination:** Odisha's progressive approach, government support, and abundant wind energy potential create an attractive investment climate.



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