IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 1, October 2025
Impact Factor: 7.67

# Assessment of Solar Energy Potential in Ayodhya District: A Comprehensive Analysis Using Solar Irradiance, Weather Patterns, and Geographical Parameters

**Mr. Prem Kumar[1] and Dr. Rajesh Kumar Verma[2]**
Research Scholar, K. S. Saket PG College, Ayodhya[1]
Assistant Professor, Department of Physics[2]
K. S. Saket PG College, Ayodhya, Uttar Pradesh, India
Dr. Ram Manohar Lohia Avadh University, Ayodhya, Uttar Pradesh, India
premagrahari0@gmail.com and iitr.rajesh@gmail.com

**Abstract:** *The global demand for clean and sustainable energy is increasing, which has put solar power at the forefront of renewable energy development. India, with its diverse geography and high levels of solar irradiance, has a strong potential to meet future energy needs through solar photovoltaic (PV) systems. This research focuses on Ayodhya District in Uttar Pradesh. This area is culturally, economically, and developmentally important but has limited assessments of its solar potential. Using data from NASA POWER, PVGIS, and the Indian Meteorological Department (IMD), this study analyzes solar irradiance, weather patterns, and land use to estimate the feasibility of PV deployment.*

*Results show that Ayodhya receives an average annual Global Horizontal Irradiance (GHI) of about 5.3 to 5.5 kWh/m²/day, with peak levels in the pre-monsoon months of April to June and lower values during the monsoon in July and August. The estimated PV yield is around 1,650 to 1,750 kWh per kWp each year, indicating that the district is very suitable for both rooftop and ground-mounted solar projects. The GIS-based land suitability analysis reveals that nearly 35 to 40% of Ayodhya's land is rated as "highly suitable" for solar farm installations, particularly flat agricultural areas and government-owned land with minimal shading. The seasonal PV yield analysis confirms significant generation potential, especially in spring and autumn.*

*The findings show that Ayodhya has great opportunities for large-scale solar development, which supports India's National Solar Mission and the Uttar Pradesh Solar Policy (2022). Policymakers can use these results to encourage solar parks, rooftop solar programs, and hybrid energy solutions. This research provides a framework for assessing solar energy at the district level and offers recommendations for incorporating solar energy into regional energy planning..*

**Keywords**: Solar energy; Ayodhya; solar irradiance; photovoltaic systems; GIS mapping; Uttar Pradesh; renewable energy potential; climate change mitigation


DOI: 10.48175/IJARSCT-29106