

# SDG 7: Affordable and Clean Energy – India’s Path to Universal Energy Access

**Dr. R. Sreelatha**

Assistant Professor, Department of Botany, Government Degree College, Medak, Telangana.

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## Abstract

The United Nations Sustainable Development Goal 7 seeks to ensure universal access to affordable, reliable, sustainable, and modern energy services by 2030. For India, achieving SDG 7 is critical for economic growth, poverty reduction, and environmental sustainability. This paper examines India’s strategies, progress, and challenges in achieving SDG 7, focusing on renewable energy integration, energy efficiency, inclusive policies, and public awareness initiatives. Drawing on recent data, this study highlights significant achievements in electrification and clean cooking fuel access, alongside persistent challenges such as regional disparities, infrastructure bottlenecks, and investment gaps. The findings suggest that while India has made substantial progress, sustained policy support, technological innovation, and financial investments are essential for meeting the 2030 targets.

## 1. Introduction

Sustainable Development Goal 7 underscores the need for affordable and clean energy as a foundation for economic development, environmental protection, and social equity. In India, energy access is a prerequisite for improving quality of life, enabling industrial growth, and addressing climate change. Since 2015, the Government of India has launched ambitious programs to expand renewable energy capacity, electrify households, promote clean cooking fuels, and enhance energy efficiency <sup>[7]</sup>. India’s energy transformation aligns with its commitments under the Paris Agreement, targeting 450 GW of renewable energy capacity by 2030 and achieving net-zero emissions by 2070 <sup>[7]</sup>. However, the journey towards universal, affordable, and clean energy access is complex, requiring policy coordination, infrastructure upgrades, and large-scale investments.

## 2. Key Strategies for Achieving SDG 7

India’s roadmap for SDG 7 focuses on an integrated approach that blends renewable energy expansion, efficiency enhancement, and universal access. Large-scale deployment of solar and wind projects forms the backbone of this strategy, supported by targeted policy interventions <sup>[4][5]</sup>. The National Solar Mission and Wind Energy Development Program have driven rapid capacity growth, while hybrid projects are improving grid stability <sup>[7]</sup>.

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Key focus areas include:

- Renewable Energy Expansion – The government aims for 450 GW renewable capacity by 2030, a significant leap from current levels of over 240 GW <sup>[4][5]</sup>. This involves scaling up utility-scale solar parks, offshore wind farms, and hybrid systems that combine renewable sources for greater efficiency. Such projects not only reduce carbon intensity but also enhance energy security <sup>[7]</sup>.
- Energy Efficiency Improvements – Schemes like the Perform, Achieve, and Trade (PAT) program, along with star-rating labels on appliances, encourage industries and households to adopt energy-efficient technologies. These measures have helped reduce energy intensity across sectors, contributing to cost savings and environmental benefits <sup>[7]</sup>.
- Universal Energy Access – The Saubhagya Scheme has brought electricity to millions of households <sup>[6]</sup>, while the Pradhan Mantri Ujjwala Yojana (PMUY) has provided subsidized LPG connections to rural women <sup>[1][3]</sup>. These initiatives aim to eliminate energy poverty and improve living standards, particularly in underprivileged communities.
- Off-grid and Mini-grid Solutions – Solar-powered microgrids, biomass plants, and small hydro projects are helping meet the needs of remote villages where grid extension is not economically viable <sup>[2]</sup>. These systems provide reliable power for homes, schools, and small enterprises, boosting local economies and education.

Through these combined strategies, India aims not just for capacity expansion but for equitable and sustainable energy access across all socio-economic segments.

### 3. Progress and Challenges

India has made notable headway toward universal energy access and renewable capacity growth. Electrification under the Saubhagya scheme has reached nearly all households <sup>[1][6]</sup>, with most reporting stable supply. The PMUY has significantly reduced indoor air pollution by replacing biomass with LPG in millions of homes <sup>[3]</sup>. Renewable energy installation rates are among the fastest globally, with solar capacity alone exceeding 116 GW in 2025 <sup>[4][5]</sup>.

However, several challenges persist:

- Infrastructure Gaps – Rural areas often face power cuts, low voltage, and unreliable connections <sup>[6]</sup>, making it difficult for industries and households to depend entirely on the grid. The lack of adequate substations and modern transmission lines hampers consistent supply <sup>[2]</sup>.
- Financing Shortfalls – The International Energy Agency estimates that India needs nearly \$68 billion annually to meet SDG 7 targets <sup>[8]</sup>, but actual investments fall short. High project costs and perceived risks deter some investors from participating in renewable ventures <sup>[4]</sup>.
- Regional Disparities – States with better infrastructure, such as Gujarat and Tamil Nadu, adopt renewable technologies faster than economically weaker states <sup>[5]</sup>. This uneven growth risks creating an energy divide between regions.
- Technological Barriers – The integration of intermittent sources like solar and wind into the grid requires advanced storage solutions and real-time monitoring systems <sup>[2][8]</sup>. Without such upgrades, grid stability could become a major bottleneck.
- Skill Deficits – There is a shortage of trained professionals capable of installing, maintaining, and operating renewable energy systems <sup>[8]</sup>. Skill development programs are yet to scale up sufficiently to meet this growing demand.

The progress is commendable, but bridging these gaps is essential for meeting SDG 7 targets on time.

#### 4. Policy Initiatives

Policy frameworks in India have been central to accelerating clean energy adoption <sup>[7]</sup>. The National Electricity Policy and National Renewable Energy Policy provide the foundation for large-scale investments, while the Renewable Energy Development Agency coordinates implementation <sup>[2]</sup>. Financial incentives, such as viability gap funding and capital subsidies, attract private sector participation <sup>[4]</sup>.

Notable policy measures include:

- Feed-in Tariffs & Competitive Bidding – These mechanisms allow renewable power producers to sell electricity at assured rates or through auctions that encourage cost competitiveness <sup>[4][5]</sup>. They have attracted global developers and driven down renewable energy tariffs in India.
- Net Metering Regulations – These policies enable households and businesses with rooftop solar panels to feed excess electricity back into the grid <sup>[2]</sup> in exchange for credits. This reduces electricity bills and promotes decentralized clean energy generation.
- Green Energy Corridor Project – This initiative focuses on building high-capacity transmission lines dedicated to renewable power evacuation <sup>[2]</sup>. It addresses the mismatch between renewable generation locations and consumption centres.
- Ujjwala Yojana Subsidies – By providing subsidized LPG connections to low-income households <sup>[1][3]</sup>, the scheme reduces dependence on firewood and kerosene, improving health outcomes and lowering deforestation rates.
- National Electric Mobility Mission – Aimed at promoting electric vehicle adoption <sup>[7]</sup>, this mission offers purchase incentives, charging infrastructure support, and tax exemptions. It indirectly supports SDG 7 by reducing fossil fuel consumption.

These initiatives could create an enabling environment, but sustained execution, financial mobilization, and inter-agency coordination still remain critical for India's clean energy transformation

#### 5. Conclusion

India's progress toward SDG 7 is noteworthy, particularly in electrification, renewable capacity expansion, and clean cooking fuel access. Yet, challenges in affordability, reliability, and equitable distribution remain. Achieving the 2030 targets will require accelerating renewable energy deployment, improving grid infrastructure, increasing investment flows, and fostering public engagement. With consistent policy support, private sector participation, and community involvement, India is well-positioned to lead in sustainable energy transitions.

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