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**DAILY EDITORIAL  
ANALYSIS**

**TOPIC**

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**Challenges Of Renewable  
Energy**

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## CHALLENGES OF RENEWABLE ENERGY

### Context

- Recent media highlights show that large-scale renewable energy development is sensitive to productive activities — agriculture and related livelihoods, with the potential for impacts on food security.

### India and Renewable Energy

- India, the world's third-largest emitter of greenhouse gases, is making significant strides in its transition to renewable energy.
- The country's efforts are not only crucial for global climate change mitigation but also for addressing domestic energy needs.

### Renewable Energy Capacity in India

- India, a country with a rapidly growing economy and increasing energy demands, has made significant strides in its renewable energy sector.
  - It added 18.48 GW of renewable energy capacity in the fiscal year 2023-24, which is over 21% higher than the 15.27 GW added a year ago.
- It was **primarily driven by solar installations** (12.78 GW) and **wind energy** (2.27 GW).
- The total installed renewable energy capacity has increased from **76.37 GW in 2014 to 178.98 GW in October 2023**, marking an increase of around 2.34 times.

### Ambitious Targets

- India has set ambitious targets for renewable energy and plans to install 500 GW of renewable energy capacity by 2030. It includes a significant increase in **solar and wind energy**.
  - It is a significant increase from the previous target of 450 GW.
- The plan involves an investment of at least ₹2.44 lakh crore or ₹2.44 trillion.

### Solar Power

- It is a key pillar of India's renewable energy strategy. The country has 214 sq. km of land under solar parks.
  - However, some studies estimate that India may need 50,000-75,000 sq. km, which is about half the size of Tamil Nadu, to achieve its Net Zero targets.
- The government's rooftop solar programme aims to enable 10 million households to obtain up to 300 units of free electricity every month.
  - It is expected to save households up to Rs 15,000-18,000 annually.

### Challenges Of Renewable Energy

- High Upfront Costs:** One of the most significant challenges of renewable energy is the high upfront costs associated with the installation of renewable energy technologies.
  - While renewable energy sources like solar and wind power save money in the long run, the initial setup costs can be prohibitive.
  - It is particularly true in developing countries, where the cost of borrowing is high.
- Infrastructure and Technical Challenges:** Renewable energy technologies require specific infrastructure and technical expertise.
  - For instance, solar and wind energy systems require extensive land use, which can lead to conflicts over land rights.
  - Additionally, these systems require regular maintenance and skilled technicians for

installation and repair.

- **Variability and Intermittency:** The variability and intermittency of renewable energy sources pose significant challenges.
  - ◆ Solar and wind power, for instance, are dependent on weather conditions and time of day, making them less reliable than traditional energy sources.
  - ◆ It necessitates the development of energy storage systems and grid infrastructure capable of managing these fluctuations.
- **Policy and Regulatory Hurdles:** Policy uncertainties and regulatory barriers can also hinder the growth of renewable energy.
  - ◆ Inconsistent policies and lack of long-term planning can create an uncertain investment environment, discouraging private sector involvement.
  - ◆ Furthermore, bureaucratic red tape and complex permitting procedures can delay project implementation.
- **Access to Raw Materials:** Access to raw materials and rare earth metals is another challenge facing the renewable energy sector.
  - ◆ These materials are essential for the manufacture of renewable energy technologies, and a projected shortage could impact the sector's growth.
- **Geographical Disparities:** Geographical disparities in the adoption of renewable energy technologies also pose a challenge.
  - ◆ While some regions have abundant renewable resources, others may lack the necessary infrastructure or resources to harness these energies.

### Renewable Energy and Concerns like Food Security in India

- India, the third-largest energy consumer in the world, is making significant strides in its transition to renewable energy.
  - ◆ The transition to renewable energy in India is fraught with challenges. Land use for renewable energy may strain a variety of ecosystems. Moreover, electricity generation has to compete with alternative uses for land such as agriculture, urbanisation, human habitation and nature conservation.
- **The Land Use Challenge:** Large-scale renewable energy projects, particularly solar parks, require extensive land use.
  - ◆ Some studies estimate that India may need 50,000-75,000 sq. km of land, about half the size of Tamil Nadu, to achieve its Net Zero targets.
  - ◆ This land requirement poses a significant challenge as it may lead to the conversion of agricultural land into solar farms.
- **Impact on Food Security:** The conversion of agricultural land for renewable energy projects could potentially impact food security.
  - ◆ Experts worry that this push for renewable energy may lead to food insecurity in the future as the country would need at least 400,000 hectares of land by 2030 to achieve its renewable goals.
  - ◆ Agriculture is a critical sector in India, providing livelihoods for millions of people and playing a vital role in ensuring food security.
  - ◆ Any policy that could potentially disrupt agricultural practices or reduce the amount of land available for farming needs to be carefully considered.

### Balancing Renewable Energy and Food Security

- Balancing the need for renewable energy with the need to ensure food security is a complex challenge. It requires careful planning and policy-making<sup>65</sup>. Policymakers need to consider

the potential impacts of renewable energy projects on agricultural practices and food security.

- One potential solution is to promote the use of wastelands for renewable energy projects.
  - ◆ It could help to reduce the pressure on agricultural land and ensure that food production is not adversely affected.
- **Budgetary Provisions:** India is exploring innovative solutions to these challenges. For instance, the Union Budget 2024-25 has allocated Rs 10,000 crore for a grid-based solar power scheme.
  - ◆ It includes provisions for viability gap funding for offshore wind energy for an initial capacity of 1 GW.
- **Global Recognition:** India's efforts in renewable energy have received global recognition. During his visit to India, the UN commended India on its shift towards renewable energy.
  - ◆ It stated that India can become a true global superpower in the fight against climate change if it speeds up its shift from fossil fuels to renewable energy.

### Conclusion and Way Forward

- Despite these challenges, the transition to renewable energy is crucial for mitigating climate change and achieving sustainable development.
  - ◆ It requires concerted efforts from governments, businesses, and individuals alike.
- Policymakers need to provide clear and consistent policy signals to encourage investment in renewable energy.
- Technological innovations are needed to improve the efficiency and reliability of renewable energy systems.
- Finally, public awareness and education are crucial for fostering acceptance and uptake of renewable energy technologies.

### DAILY MAINS PRACTICE QUESTION

[Q] Discuss the major challenges associated with the renewable energy sector in India. How do these challenges impact India's energy security and environmental sustainability goals?

