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YOJANA MAGAZINE ANALYSIS

(February 2025)

(Part 3/4)

TOPICS TO BE COVERED

PART 1/4

- PM KUSUM: EMPOWERING FARMERS WITH SOLAR ENERGY
- ENERGY SECURITY IN INDIA

PART 2/4

- INDIAN CARBON MARKETS
- SMART CITIES MISSION & ROLE OF ENERGY EFFICIENCY

PART 3/4

- SCOPE & OPPORTUNITIES FOR RENEWABLE ENERGY IN RURAL INDIA
- GREEN HYDROGEN

PART 4/4

- BIOFUELS AS A PROMISING SUBSTITUTE FOR HIGH CARBON ENERGY SOURCE
- PRAGATI: DRIVING INDIA'S DEVELOPMENT WITH PURPOSE

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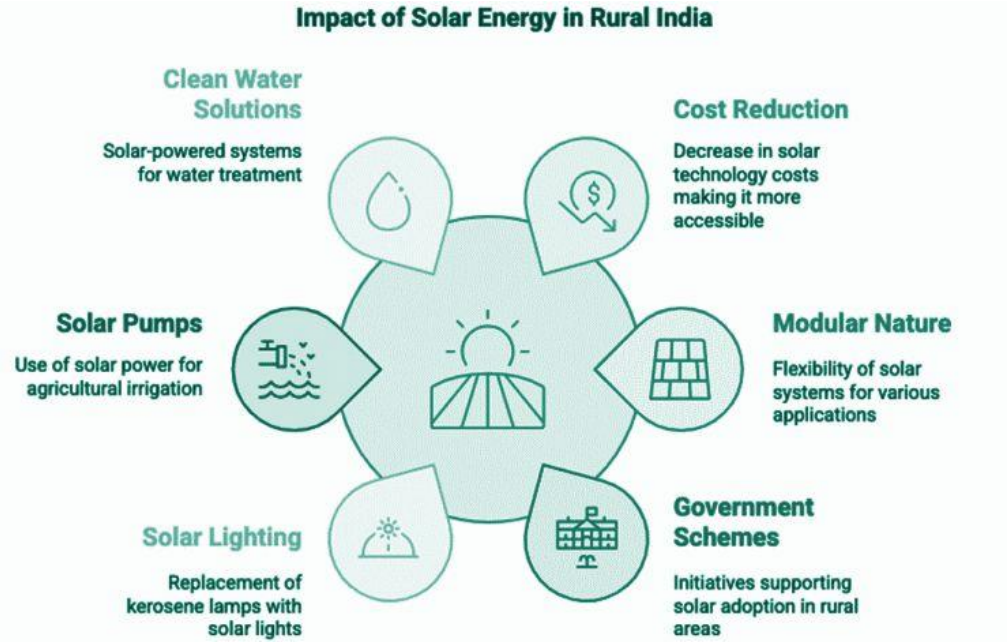
SCOPE & OPPORTUNITIES FOR RENEWABLE ENERGY IN RURAL INDIA

- India's renewable energy sector has grown significantly, **reaching a capacity of 203.1 GW by 2024.**
- **This represents 46.3%** of the country's total power capacity.
- **With 67% of India's population living in rural areas,** there's a huge opportunity to use renewable energy to improve lives and bridge the gap between rural and urban areas.
- However, rural India still faces major challenges, such as lack of basic services like electricity, clean water, and sanitation.
- These not only harm health but also cause a heavy burden on government subsidies.



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GOVERNMENT INITIATIVES TO PROMOTE RENEWABLE ENERGY IN INDIA

The Indian government has introduced several key programs to support renewable energy, especially in rural areas. These efforts aim to boost access to clean energy and reduce dependency on outdated energy sources.

- **Foreign Investment and Policy Reforms:**
  - The government allows **100% foreign direct investment (FDI)** in renewable energy projects, making it easier for global companies to invest in India's clean energy sector.
- **National Green Hydrogen Mission:**
  - This mission aims to produce **5 million metric tonnes of Green Hydrogen** by 2030, which will help reduce reliance on fossil fuels and promote cleaner energy solutions.
- **Waiver of Transmission Charges:**
  - The government has waived **charges for transferring renewable energy** across states until 2025 for solar, wind, and green hydrogen projects.
  - This encourages the spread of renewable energy across the country.

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- **Ultra Mega Renewable Energy Parks:**
    - To make land and infrastructure available for renewable energy developers, the government is setting up **Ultra Mega Renewable Energy Parks**.
    - These parks allow developers to connect their projects to the grid more easily.
- **PM-KUSUM and Solar Rooftop Programs:**
    - The **Pradhan Mantri Kisan Urja Suraksha evam Utthaan Maha Abhiyan (PM-KUSUM)** program aims to provide farmers with **solar-powered pumps** to help them irrigate their land.
    - Other initiatives like **Solar Rooftop Phase II** and the **12000 MW CPSU Scheme Phase II** focus on increasing solar energy capacity at the local level.
- **PM Surya Ghar: Muft Bijli Yojana:**
    - The government has launched the **PM Surya Ghar: Muft Bijli Yojana**, which plans to install **rooftop solar systems** in 1 crore rural households by 2027, providing up to **300 free units of electricity per month**.

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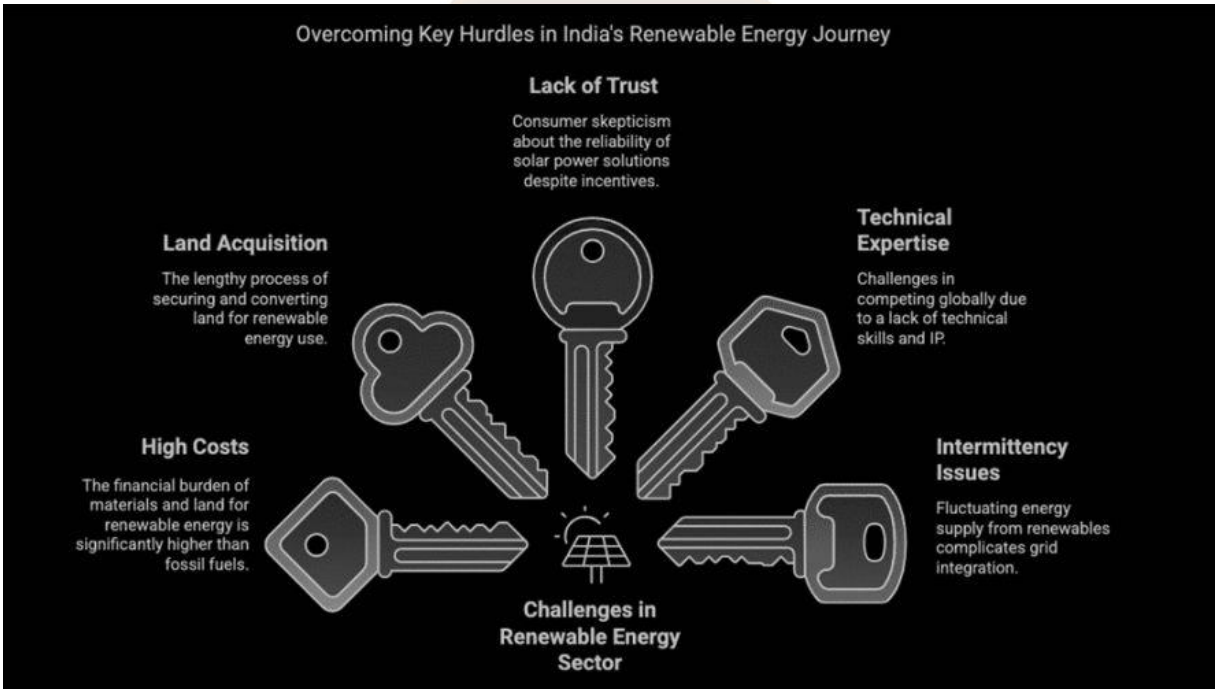
- **Improving Transmission Infrastructure:**
    - To transport renewable energy from rural areas to cities, the **Green Energy Corridor Scheme** is being developed, which includes new transmission lines and substations.
- **Offshore Wind Projects:**
    - The government has also approved **Viability Gap Funding (VGF)** for **offshore wind projects**, aiming to generate **1 GW of wind energy** off the coasts of Gujarat and Tamil Nadu.
- **Financial and Policy Support:**
    - Programs like **Uniform Renewable Energy Tariff (URET)** help standardize energy pricing, while **Standard & Labelling programs** ensure that solar products meet high-quality standards.
- **Union Budget 2024-25:**
    - The Union Budget for 2024-25 has allocated **₹68,769 crore** for renewable energy projects, focusing on energy security, affordability, and transitioning to cleaner energy sources.
    - The government also plans to include **small modular nuclear reactors** in its energy mix.

CHALLENGES FACING RE SECTOR IN RURAL INDIA

While these government initiatives are promising, there are still some challenges that need to be addressed to fully unlock the potential of renewable energy in rural India.

- **Grid Infrastructure Limitations:**
  - Many rural areas lack the necessary infrastructure to integrate renewable energy into the grid.
  - **Inadequate transformer capacity** and limited grid expansion are key barriers to progress.
- **Local Acceptance and Awareness:**
  - Although programs like **PM Surya Ghar** have received a lot of interest, local acceptance can be slow.
  - **Approval delays**, lack of awareness, and inadequate support from local authorities can slow down installation and adoption.
- **Financial Constraints for Rural Households:**
  - Even with government assistance, many rural households may find it difficult to afford the **initial costs** of installing renewable energy systems or maintain them over time.

- **Energy Storage and Reliability:**
  - A key challenge with renewable energy, especially solar and wind, is ensuring reliable **energy storage**.
  - Without proper storage systems, power supply may not be consistent, especially during nights or cloudy days.



CONCLUSION

India is making **great progress in expanding renewable energy**, and rural areas have huge potential to benefit from this transformation. The government's initiatives, such as financial support, policy reforms, and large-scale projects, are creating an encouraging environment for clean energy development.

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GREEN HYDROGEN: INDIA'S PATH TO A SUSTAINABLE FUTURE

- India has set ambitious goals for the future, including **energy independence by 2047** and **Net Zero emissions by 2070**. **Green Hydrogen** is a key part of this vision, offering a clean and sustainable energy solution that can reshape India's energy sector.
- The **National Green Hydrogen Mission (NGHM)** aims to build a strong Green Hydrogen ecosystem in India and address the opportunities and challenges of this emerging energy sector.

GREEN HYDROGEN: A GLOBAL PERSPECTIVE

- The global transition to clean energy is speeding up due to concerns about:
  - **Climate change**
  - **Energy security**
  - The need for **economic growth**
- Green Hydrogen, produced using renewable energy sources, has the potential to help decarbonize sectors that are hard to address with traditional renewable energy, such as:
  - **Industry**
  - **Transport**
  - **Power generation**
- India is positioned to play a leadership role in the Green Hydrogen sector as countries globally ramp up production and adoption.

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ADVANCING ENERGY INDEPENDENCE & SUSTAINABLE DEVELOPMENT

- India's **energy demand** is expected to grow by **25%** by 2030.
- Over **40% of India's energy** is currently imported.

Green Hydrogen can:

- Reduce India's dependence on fossil fuels
- Lower carbon emissions
- Improve **energy self-sufficiency**

It also presents an opportunity for India to become a **major producer and exporter of Green Hydrogen**. The National Green Hydrogen Mission will help India become a low-carbon, self-reliant economy, driving sustainable development in the country.

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NATIONAL GREEN HYDROGEN MISSION

- Launched in **January 2023**, the NGHM aims to position India as a global leader in:
    - Green Hydrogen **production**
    - Green Hydrogen **use**
    - Green Hydrogen **export**
- The mission targets an annual Green Hydrogen production of:
    - **At least 5 million metric tonnes (MMT)** by 2030
    - Potential growth to **10 MMT per year**

SCALING GREEN HYDROGEN PRODUCTION

- India currently consumes **5 MMT of hydrogen** annually, mostly from fossil fuels (**Grey Hydrogen**).
- The NGHM aims to **scale up Green Hydrogen production**, which is made from renewable energy, by improving technologies and reducing costs.

Key strategies include:

- Increasing **electrolyzer capacity**
- Boosting **domestic production**
- Developing **decentralized models** for Green Hydrogen production

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The mission **also plans to develop infrastructure** for:

- **Storage**
- **Delivery**
- **Export** of Green Hydrogen

Hydrogen Hubs and export facilities will be established to support these efforts.

COORDINATED EFFORTS & GOVERNANCE

- The success of the NGHM requires **cooperation** across multiple ministries, departments, and institutions at both central and state levels.
    - The **Ministry of New and Renewable Energy (MNRE)** is leading the mission.
    - Other ministries will help integrate Green Hydrogen into their respective sectors.
- A detailed governance structure, including:
    - **National Green Hydrogen Advisory Group**
    - **Empowered Group**
- These bodies will oversee the mission's implementation.

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ECONOMIC & ENVIRONMENTAL OUTCOMES

The NGHM is expected to bring **economic benefits** through:

- **Decarbonization** of industries
- Reduced **fossil fuel imports**
- **Domestic manufacturing** and **job creation**
- **Technological innovation**

Environmental impact:

- The mission is expected to **avoid 50 MMT of CO2 emissions** annually, helping India achieve its **Net Zero** emissions target by 2070.

FINANCIAL OUTLAY & RISK MANAGEMENT

- **Initial funding** for the NGHM is **₹19,744 crore**.
- This funding will support components like:
  - **SIGHT program**
  - **Pilot projects**
  - **Research and development (R&D)**

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The mission incorporates **risk management strategies** to address challenges such as:

- **Supply chain issues**
- **Technology risks**
- **Financial concerns**
- **Market uncertainties**

CONCLUSION

Green Hydrogen is critical for India's **sustainable energy future** and decarbonization efforts. The **National Green Hydrogen Mission** aims to establish a robust Green Hydrogen ecosystem that will Foster **innovation,** Attract **investment,** Drive **economic growth** By focusing on Green Hydrogen, India can reduce its carbon footprint, improve energy security, and play a major role in global efforts to combat **climate change**.