SOLAR GRID AND ENERGY POVERTY - GS III MAINS

Q. Solar energy mini-grids can help end energy poverty of rural communities in climate-vulnerable regions. Critically Examine (15 marks, 250 words)

News: *The small grid – energy security, with a little help from the Sun*

What's in the news?

- There is a private sector-led revolution underway to lift 500 million people out of energy poverty. The transformation is thanks to clean energy mini-grids that are popping up in rural communities across Asia, Africa, Latin America and Small Island Developing States and, in the process, serving many small businesses and households.

Key takeaways:

- Solar energy mini-grids can help end energy poverty of rural communities in climate-vulnerable regions.
- Investments in these renewable energy initiatives must be scaled up.

Energy Poverty and Mini Solar Grids:

- ***Energy poverty*** refers to the lack of access to modern energy services, including electricity and clean cooking facilities. Around 9% of the global population still lacks access to electricity, with Sub-Saharan Africa and rural areas being the most affected.
- ***Mini solar grids*** are decentralized energy systems that use solar power to generate electricity on a smaller scale (a few kilowatts up to 10 megawatts). These grids are often employed in rural and off-grid areas, providing a sustainable and cost-effective solution to address energy poverty.
- They are characterized by their ability to operate independently or in conjunction with centralized grids, offering reliable and clean power to underserved communities.
- World Bank is aiming to fund a thousand mini-grids, to bring electricity to 75% of the 675 million globally without it

Significances of Mini grids:

1. **Economic and Environmental Benefits**: Solar mini-grids offer a cost-effective, sustainable alternative to diesel generators. They are instrumental in reducing reliance on fossil fuels and promoting renewable energy.
2. **Decentralised energy systems**: In the absence of centralised grid infrastructure, these grids are crucial in climate-vulnerable regions, offering resilience against climate shocks like drought and flooding.

3. **Development Accelerators**: Beyond providing electricity, these grids facilitate various rural development services, enhancing the quality of life and economic opportunities in rural areas.
    - Mini grid companies are also providing mobile telephony, irrigation, agro-processing, e-mobility.
    - Cost of solar PV energy is now highly competitive, standing at $24/MWh, lower than both coal and natural gas.
4. **100% electrification in India**: Under e Pradhan Mantri Sahaj Bijli Har Ghar Yojana ('Saubhagya'), in March 2019, government declared 100 percent electrification of all 'willing' households. But this effort was aimed at extending the reach of grid electricity, which does not specifically address the quality and reliability of electricity supply. Mini grids are important in improving reliability of electricity services.

Challenges of installing mini grids:

1. **Funding requirement:**
    a. Despite being the cheapest source, only 10 percent of the amount required to achieve net-zero emissions has been invested in solar energy.
    b. About $220 billion is required to build 210,000 mini-grids needed globally. Currently, solar investments are only 10% of what is needed for net-zero emissions.
2. **Energy bias:**
    a. There is a bias towards favouring large-scale solar projects on the national and international level.
    b. International frameworks like ISA (International Solar Alliance) are favouring such bias.

WAY FORWARD:

- **Energy mix**: There is a need of diverse energy mix, which is focussed on adequate centralised and distributed renewable generation.
- **Financial Mechanisms:** Implementing guarantees and innovative financial mechanisms, along with robust risk underwriting, can catalyze private sector investment in solar mini-grids.
- **International Support:** Initiatives like the ISA's Global Solar Facility aim to catalyze investments in solar projects, especially in underserved regions. Similar initiatives are required for mini grids as well.