India's First 24x7 Solar-Powered Village

The Government of India is prioritizing meeting the country's energy demands through renewable sources of energy in general and solar energy in particular. In this context, the Indian government has announced measures such as the National Solar Mission, has played a key role in the International Solar Alliance (ISA), and has recently declared Modhera in Gujarat as India's first 24x7 solar-powered village.

This is an important topic for the UPSC exam, in the energy and economy segments.

Solar Energy in India Overview

India's solar sector has grown at a CAGR of around 59% from 0.5GW in 2011 to 55GW in 2021.

- The Jawaharlal Nehru National Solar Mission (JNNSM) or the National Solar Mission (NSM) was announced in January 2010 and the total installed capacity target was set as 20 GW by 2022.
- However, the target was revised to 100 GW in 2015 and in August 2021, the government once again revised the solar target of achieving 300 GW by 2030.
- After providing impetus to the development of various solar power plants in India, the Prime Minister of India on 9th of October 2022 declared **Modhera** in Gujarat as India's first 24×7 solar-powered village.

Modhera - India's First 24x7 Solar-powered Village

Modhera is a village located on the banks of River Pushpavati in the Mehsana district of Gujarat.

- Modhera is also famous for the Chaulukya-era Sun Temple. According to the Prime Minister, Modhera which was earlier known as "Surya Mandir" has now become a "Saur Gram" and has been placed on the environmental and energy map of the world.
- Under this project, the government has undertaken the task of complete solarisation of Modhera village by developing a **Ground Mounted Solar power plant** and installing over **1300 rooftop solar systems** on both government as well as residential buildings.
    - Around 271 houses out of the 1600 houses in Modhera have installed rooftop solar systems.
    - Further, all of these systems are integrated with a **Battery Energy storage system (BESS)** which is the country's first ever grid-connected megawatt-hour scale battery energy storage system that would help in providing electricity to the houses during the evenings.

- The project is said to be completed at a cost of ₹65 crores with 50% funding by the Gujarat Government and the other 50% funding by the Union Government.

Significance of the project

- The project is regarded as the first-of-its-kind initiative in the country and provides the much-needed impetus and experience to future projects of a similar kind.
- Modhera at present has been equipped with a 6 MW solar plant and a 15 MWh battery energy storage system on 12 hectares and the solar energy generated will help power house lights, agricultural needs and vehicles of the village.
- The installed rooftop solar systems will help the villagers save about 60% to 100% of their electricity bills.
- The project will also help generate extra income as the villagers can sell the excess power to the government besides utilising it for their needs.
- Further, the project will play a key role in realising the dream of AatmaNirbhar Bharat or self-reliant India because, under this project, both the producers and the consumers of electricity are the people themselves.
- The UN Secretary-General Antonio Guterres has hailed India's first solar-powered village as an example of "reconciliation between humankind and planet".
- All of the benefits of the project ultimately lead to the empowerment of people at the grassroots level.

Trends in India's solar power generation

India is ranked fifth in terms of installed solar power capacity after China, the U.S., Japan and Germany.

- By 2021, the total installed solar capacity in the country was over 55 GW.
- Out of the 55GW capacity, nearly 77% is contributed by the grid-connected utility-scale projects and the remaining is from the grid-connected rooftop and off-grid projects.
- Solar energy production in India accounts for close to 50% of the total renewable energy (RE) capacity of India (excluding large hydropower) and about 14% of the total power generation capacity.

Key challenges to solar energy projects in India

- Lack of consumer awareness
- COVID pandemic-induced supply chain disruptions and policy restrictions
- High taxes on imported cells and modules
- Challenges in negotiating power supply agreements (PSAs)
- Problems with banking and financing

- Regulatory challenges, inconsistent policy frameworks and delays in the approval of grants

Solar energy prospects for India

- Acknowledging the large consumer base of India and the fact that solar energy provides electricity at a cheaper price than any of the other sources, the future of the solar energy market in India is very bright.
- The use of solar pumps and the adoption of solar technologies in agricultural practices can bring about transformational changes in the Agri sector.
- In the future, nearly half of the energy requirement can be met by solar energy through utility-scale power plants.
    - These are huge power plants and one such plant has been established in Rajasthan with 1000 MW and ₹35,000 crore investment.
- The government's policy of working towards enabling people to produce their own electricity by installing solar panels in their homes and fields is expected to pay rich dividends.
- Further, solar energy can also help improve various other sectors such as storage facilities, transportation services, the healthcare sector, etc.

Conclusion

- The development of Modhera as India's first 24×7 solar-powered village has provided significant momentum to the solar energy sector of India and has offered unique solutions to the traditional challenges of water and electricity scarcity in the country's villages.
- More such solar-powered villages are expected to be developed in the coming days as they play an essential role in promoting green energy, sustainability and self-reliance.