

# A Solar City Project Ayodhya (2023) Vision for A Sustainability Model

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**Abstract** - In the present context, non-renewable energy sources are limited and energy consumption is increasing day by day and affecting the environment. Solar energy proves to be a large energy source that can be used to fulfill Sustainable development and can be possible by the use of sustainable energy and by ensuring access to affordable, reliable, sustainable, and modern energy for citizens. The government has designed policies, programs, and a liberal environment to make India a sustainability model for the upcoming scenario. Today, when rapid urbanization has become an environmental concern all over the world, the concept of solar cities assumes a crucial role to play in realizing not only the sustainability potential of cities but also transforming urbanization into an opportunity with the primary focus on execution of renewable energy projects to minimize the use of fossil fuel and fulfill the electricity demand or energy demand and save the environment. Ayodhya is UP's first proposed solar city model with the major goal to develop the temple town as a solar city where all the sectors of the area whether urban or rural will meet their energy needs and this particular model will further be used as a framework model for other cities.

This paper intends to review the proposed and ongoing solar city framework models of India (Ayodhya) and identify the importance of solar design parameters in urban areas of the city for the futuristic sustainable development approach and how the dedicated and standalone goal on energy i.e., SDG 7 can be accomplished.

**Key Words:** Introduction, Literature Review, Solar City, SDG Goals, Policies, Conclusion, References

## 1. INTRODUCTION

The sources of electricity production such as coal, oil, and natural gas have contributed to one-third of global greenhouse gas emissions. It is essential to raise the standard of living by providing cleaner and more reliable electricity. India has an increasing energy demand to fulfill the economic development plans that are being implemented. The provision of increasing quanta of energy is a vital pre-requisite for the economic growth of a country. An energy source is a necessary element of socioeconomic development. The increasing economic growth of developing nations in the last decades has caused an accelerated increase in energy consumption. This trend is anticipated to grow. A prediction of future power consumption is essential for the investigation of adequate environmental and economic policies. Likewise, an outlook on future power consumption helps to determine future investments in renewable energy. Energy supply and security have not only increased the essential issues for the development of human society but also for their global political and economic patterns. The country will have a rapid and global transition to renewable energy technologies to achieve sustainable growth and avoid catastrophic climate change. Renewable energy sources play a vital role in securing sustainable energy with lower emissions. It is already accepted that renewable energy technologies might significantly cover the electricity demand and reduce emissions. In recent years, the country has developed a sustainable path for its energy supply. Awareness of saving energy has been promoted among citizens to increase the use of solar, wind, biomass, waste, and hydropower energies. Ayodhya is a city situated on the banks of the river Saryu. Its site is well known to this day under the contracted name of Oudh. Ayodhya is the birthplace of Bhagwan Shri Ram and the setting of the great epic Ramayana. According to Ramayana, Ayodhya was founded by Manu. It is a sacred place not only for the Hindus but also for many other religions in India such as Jainism, Buddhism, Sikhs, and Islam. Every year, between 10 and 20 million people visit the city, and it has evolved into an important Yatra center. Ayodhya is well connected by road and rail to Lucknow, Prayagraj, Varanasi, Sultanpur, Jaunpur, and other cities of North India. New Delhi: Yogi government has prepared the blueprint to develop Ayodhya as a solar city. The action plan has already been prepared in this regard by the Uttar Pradesh New and Renewable Energy Development Agency and has also been presented before the chief minister. The state government has made a provision of ₹317 crore in the budget for implementing the Uttar Pradesh Solar Energy Policy-2022. The ongoing road widening project in Ayodhya will be completed in the next two years, assured the state government in the budget 2023-24. Three stretches of road are being widened in Ayodhya as part of the Ayodhya development plan along with the construction work of Ram Mandir.

## 2. SOLAR CITY

Growing concerns about Global warming and climate change require an emphasis on clean and green energy. Solar energy is our earth's primary source of renewable energy. In this scenario, solar energy proves to be an abundant energy source that can be put to use. The government set up 50% cumulative power generation capacity from non-fossil fuel-based energy resources by the year 2030. Electricity generation from solar energy at present is no more a new concept to the world. Solar electricity is pollution-free, silent, limitless, and free will play a great role in the times to come in the present energy-driven civilization.

Solar City focuses on the implementation of renewable energy projects to mitigate fossil fuel consumption and to meet the rapidly rising electricity demand of city/town using renewable energy projects/systems/devices such as solar PV systems, kitchen waste-based plants, solar water heating systems, solar cooking systems, solar steam generating/drying/air heating systems, solar concentrators. In a Solar City, all types of renewable energy-based projects like solar, wind, biomass, small hydro, waste to energy, etc. may be installed along with possible energy efficiency measures depending on the need and resource availability in the city.

### 2.1 OBJECTIVES OF THE PROGRAM

- The Solar City aims at a minimum 10% reduction in projected demand for conventional energy at the end of five years, through a combination of enhancing supply from renewable energy sources in the city and energy efficiency measures.
- To enable/empower Urban Local Governments to address energy challenges at the City - level.
- To provide a framework and support to prepare a Master Plan including an assessment of the current energy situation, future demand, and action plans.
- To involve various stakeholders in the planning process to oversee the implementation of sustainable energy options through public-private partnerships.
- To build capacity in the Urban Local Bodies and create awareness among all sections of civil society.

### 2.2 CRITERIA FOR SELECTION OF CITIES

- The city is identified based on city population, potential, regional setting, and commitment to the adoption of renewable energy and energy conservation in the city.
- Potential for adoption of energy conservation and renewable energy in the city.
- Activities and initiatives already taken by City Council/ Administration/ Private Developers/Industry/General Public in promoting renewable energy and energy conservation.
- Regulatory measures are taken on the deployment of energy conservation and renewable energy technologies.
- Willingness to provide resources and sustenance of activities initiated under the program.
- The cities may have a population between 0.50 lakh to 50 lakhs.

## 3. ABOUT AYODHYA SOLAR CITY

Ayodhya is UP's first solar city, showcasing it as a model for the country. the goal of develop the temple town as a solar city where houses, ashrams, temples, and all government offices/buildings will have solar panels mounted on their roof-tops to meet their energy needs. By New and Non-Renewable Energy Development Agency (NEDA). The government has appointed UP NEDA as the nodal body to implement its solar city project in the state. "The draft solar policy seeks to develop 20 towns, including Ayodhya, as solar cities. the work in Ayodhya immediately to develop it as a model solar city at the earliest.

Installation of solar rooftops by government bodies in Ayodhya while we encourage residential consumers to apply for solar rooftops. There is a plan to operate one high-capacity solar boat in river Saryu and run one solar community kitchen for devotees within the Ram temple complex or at some other appropriate place, apart from installing solar street lights and solar high-mast lights in Ayodhya. there are 52,000 residential power consumers with an electrical load of 162 MW and only 15% of the households are technically fit to have solar panels atop their roofs. Consumers with solar rooftops will have bi-directional meters (net meters) through which any solar power they generate more than their requirement will automatically flow into the grid and the DISCOM concerned will adjust the power in the consumers' electricity bills at the rate (around Rs 3.5 per unit) as determined by the regulator. the Ayodhya Solar City Portal would make it easy for the people of Ayodhya to apply online for solar rooftops and get a subsidy on the same in a smooth manner.

The Government will also allocate funds for the installation of solar panels on government buildings. Besides, solar energy will be used in street lights, high masts, fans, and passenger waiting rooms as well as public convenience centers of Panch, Chaudah and Chaurasi Kosi Parikrama Marg to be developed according to the convenience of tourists/devotees. The mobile phone charging points will also be connected to it.

Furthermore, Sita Rasoi (kitchen), which will have the capacity to feed 10,000 people per day, will also run on solar power. The government will give special grants for the installation of solar panels on rooftops to those interested in the

exercise. the annual energy consumption of Ayodhya City is about 281 million units whereas the desired solar capacity for the solar city is 165 MW. Out of this, 130 MW of solar energy will be supplied by installing solar plants on the identified land while 27 MW will be received from solar panels installed on the rooftops of the private and public buildings. The remaining power will be received from solar plants to be installed at other places developing Ayodhya into one of the most sought-after tourist places of the world and has an elaborate plan for it.

Ayodhya has developed into a city that disseminates the message of environmental protection to the country and the world at large and the plan for solar city.

#### 4. SDG 7: - AFFORDABLE AND CLEAN ENERGY

Development of the human race and the economy is hampered by a lack of access to energy sources and transformation systems. The environment offers a variety of renewable and non-renewable energy sources, including uranium, sun, wind, hydropower, geothermal, and biofuels. Global climate change consequences will result from increased fossil fuel use in the absence of mitigation measures for greenhouse gas emissions. Disaster risk reduction and climate change mitigation are facilitated by using renewable energy sources and energy efficiency. Ecosystem preservation and protection enable for the continued use and advancement of hydropower and bioenergy sources.

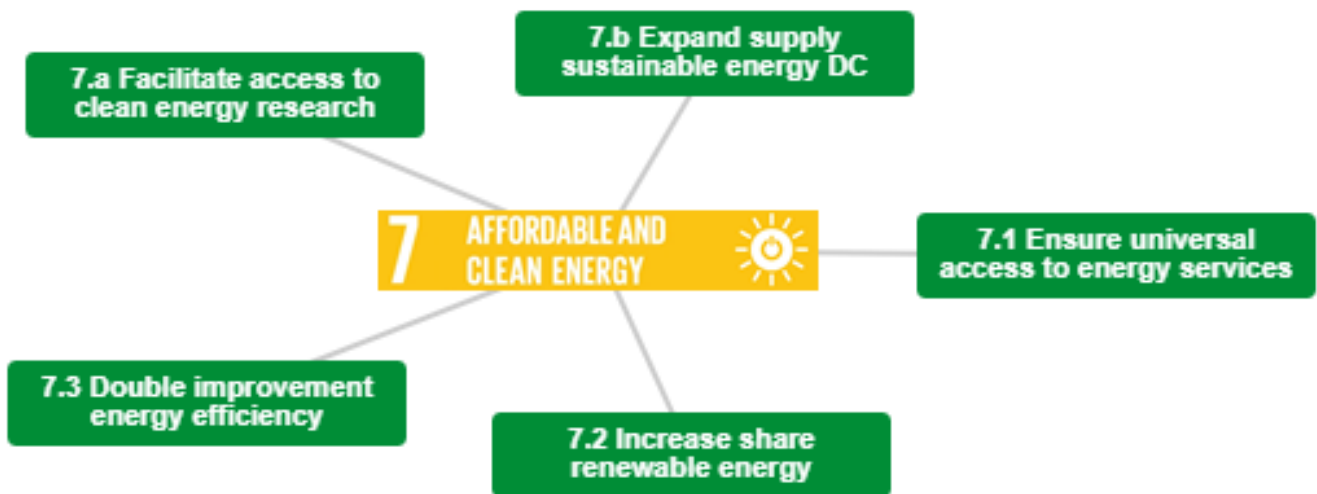


Fig 1: Targets linked to the environment

#### 5. THE SOLAR ENERGY POLICIES:

##### 5.1 ROOFTOP SOLAR PV PROJECTS

- Provision of solar cells in each district, virtual net metering.
- Net metering arrangement for govt. offices, and educational institutions.
- Net billing to commercial & industrial consumers.
- Concept of solar city with min 10% total demand met from RE.
- Subsidy to the residential consumer Rs 15,000 / kw to a max of Rs 30000/- per consumer. with net metering under “Saurya Uttar Pradesh Yojna”.
- Additional MNRE subsidy.
- Up to 4.5 m extra height is allowed for RTS.
- Up to 10 kw RTS exempted from the inspection by the state electrical inspector.
- Max 2 MW capacity allowed as per RSPV Regulation -2019.

##### 5.2 OFF – GRID SOLAR APPLICATIONS

- Promotion of off-grid solar systems such as solar power plants, solar street lights, and solar. PV pumps in Anganwadi centers, schools, etc.
- To provide electricity to households in remote unelectrified villages/hamlets of districts.
- District-level committee constituted under the chairmanship of the DM.
- Setting up of solar cold storage.

##### 5.3 SALE OF SOLAR POWER TO DISTRIBUTION LICENSEE

- Through a competitive bidding process.

- PM KUSUM C-1: Solarization of installed on-grid pumps, 70% state subsidy to the ST, Musahar caste farmers, etc. & 60% to others.
- PM KUSUM C-2: Solarization of segregated agriculture feeders, the state will provide a max VGF of Rs. 50 lakh/MW, in addition to the MNRE subsidy, project allocation through competitive bidding.

#### **5.4 UTILITY GRID POWER SOLAR PROJECTS**

- Min capacity of 5MW at a single location.
- Project award through a competitive bidding process.
- For projects in Bundelkhand and Purvanchal region, the state government will bear the cost for the construction of the maximum transmission line length as follows:
- Capacity (MW)- 5 to 10 MW, 10 MW to 50 MW, above 50 MW—Length of transmission 10KM, 15KM, 20 KM.

#### **5.5 SALE OF SOLAR POWER TO THIRD PARTY OR CAPTIVE USE**

- Exemption of 50% on wheeling charges/transmission charges on the intrastate sale of power to a third party or in case of captive use.
- Cross subsidy surcharges and wheeling charges/transmission charges will be exempted 100% for the intrastate transmission system on the purchase of solar power.

#### **5.6 PROMOTION OF SOLAR POWER PROJECTS SET UP ON FLOATING / RESERVOIR / CANAL TOPS OR ANY WATER BODY**

#### **5.7 SOLAR PV INSTALLATION ALONG RAILWAY TRACKS, EXPRESSWAYS AND ROADS**

- UP has 6 expressways having around 2000 km, a potential of around 500MW.

#### **5.8 DEVELOPMENT OF SOLAR PARKS**

- Bundelkhand region: facilitation for evacuation of solar power of 4000 MW capacity, green energy corridor is being set up.

##### **5.8.1 PRIVATE SECTOR SOLAR PARK**

- The state govt will provide revenue land for setting up a solar park on lease for 30 years at rs 15000/- per acre per year to promote investment in this sector.

##### **5.8.2 PUBLIC SECTOR SOLAR PARK THROUGH JV COMPANIES**

- Lucknow Solar Power Development Corporation Ltd (LSPDCL), Bundelkhand Saur Urja Pvt Ltd (BSUL), and TUSCO.
- Incentives for setting up of solar parks in the public sector: revenue land will be provided for setting up a solar park on a lease or right-to-use basis for 30 years at Rs 1/- per acre per year

##### **5.8.3 SOLAR POWER PROJECTS WITH STORAGE SYSTEMS**

- Need for storage to reduce the variability of solar power.
- BESS: capital state subsidy of Rs 2.50 CR/MW for utility-scale solar power projects with 4 hours battery storage system of 5MW capacity or above and a standalone battery storage system.
- Pumped storage plants (PSPs): PSPs will be promoted as per the provision of UP industrial investment and employment promotion policy -2022.

##### **5.8.4 SOLAR POWER PROJECTS ON PRIVATE LAND**

- Deemed conversion of land use from agriculture to non-agriculture.
- Lease period of thirty years.
- 100 % exemption on chargeable stamp duty on the land purchased or leased.

## **6. CONCLUSION**

New tactics adopted by SolarCity. The Indian economy and the environment both benefited greatly from the 30% investment tax credit. Fossil fuel energy, which contains a significant quantity of carbon and significantly contributes to global warming, has been used less as a result of Solar City. It is just a matter of time before all homes are powered by solar energy, with solar installations rising 30% last year. The Solar City aims at a minimum 10% reduction in projected

demand for conventional energy at the end of five years, through a combination of enhancing supply from renewable energy sources in the city and energy efficiency measures.

Although there are significant differences depending on latitude and season, the majority of the Earth's surface receives enough solar radiation to enable low-grade heating of structures and water. The only renewable energy source that can eventually replace the non-renewable sources that make up the majority of the world's energy supply is direct solar energy use.

At a time when rapid urbanization is a global environmental concern, the idea of solar cities is assumed to play a crucial role in realizing not only the sustainability potential of cities but also in turning urbanization into an opportunity with the primary focus on execution of renewable energy projects to minimize the use of fossil fuels, satisfy the demand for electricity or energy, and protect the environment.

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