

MINISTRY OF NEW AND RENEWABLE ENERGY

**IMPLEMENTATION OF DEVELOPMENT OF SOLAR PARKS
AND ULTRA MEGA SOLAR POWER PROJECTS - A REVIEW**

**COMMITTEE ON ESTIMATES
(2023-24)**

THIRTY-FIRST REPORT

SEVENTEENTH LOK SABHA



**LOK SABHA SECRETARIAT
NEW DELHI**

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(2023-24)
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AND ULTRA MEGA SOLAR POWER PROJECTS - A REVIEW**

(Presented to Lok Sabha on 12 December, 2023)



**LOK SABHA SECRETARIAT
NEW DELHI**

December, 2023/Agrahayana, 1945 (Saka)

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COMPOSITION OF THE COMMITTEE ON ESTIMATES (2022-2023)

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27. Shri Prathap Simha
28. Shri Parvesh Sahib Singh
29. Smt. Sangeeta Kumari Singh Deo
30. Shri R. K. Singh Patel *

* Elected as Member of the Committee vide Bulletin Part II Para No. 7096 dated 28th July, 2023

\$ Vacancy created due to resignation of Col. Rajyavardhan Singh Rathore, Member of Lok Sabha, vide CB-I note dated December 08, 2023.

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INTRODUCTION

I, the Chairperson of the Committee on Estimates, having been authorized by the Committee to submit the Report on their behalf, do present this Thirty-First Report on the subject "Implementation of Development of Solar Parks and Ultra Mega Solar Power Projects - A review"

2. India, with its large population and rapidly growing economy, needs access to clean, cheap and reliable sources of energy. India lies in the high solar insolation region, endowed with huge solar energy potential with most parts of the country having about 300 days of sunshine per year with annual mean daily global solar radiation in the range of 4.5-6.5 kWh/m²/day. In this backdrop, with a view to examine various aspects of Solar Energy and its development in the Country, the Committee on Estimates (2022-23) selected this subject for in-depth examination and report to the House. Committee on Estimates (2023-24) continued with examination of the Subject.

3. In this Report, the Committee have dealt with various aspects Solar Power development in the Country such as concept of Solar Parks and its working, timelines for development of Solar Parks, Financial model of the Scheme, Central Financial Assistance (CFA), various modes for selection of Solar Power Park Developers (SPPDs), Challenges in implementation of the Solar Parks Scheme etc. The Committee have analysed these issues in detail and made observations/recommendations in the report.

4. Committee on Estimates took oral evidence of the representatives of Ministry of New and Renewable Energy on the subject on 14th September, 2022. The Committee also held informal discussions on the subject during its study visits on 4th July, 2022 at Sawai Madhopur and 19th August, 2023 at Rameshwaram. The draft Report was considered and adopted by Committee on Estimates (2023-24) at their sitting held on 6th December, 2023.

5. The Committee wish to express their thanks to the representatives of the Ministry of New and Renewable Energy for furnishing material, written replies to list of points and tendering evidence before them.

6. For facility of reference and convenience, the observations/recommendations of the Committee have been printed in bold in Part-II of the Report.

NEW DELHI;
6 December, 2023
15 Agrahayana,1945 (Saka)

DR. SANJAY JAISWAL
CHAIRPERSON
COMMITTEE ON ESTIMATES

REPORT
PART I
Chapter I
INTRODUCTORY

I. Solar Energy Scenario:

1. India, with its large population and rapidly growing economy, needs access to clean, cheap and reliable sources of energy. India lies in the high solar insolation region, endowed with huge solar energy potential with most parts of the country having about 300 days of sunshine per year with annual mean daily global solar radiation in the range of 4.5-6.5 kWh/m²/day. In this backdrop, the implementation of 'Development of Solar Parks and Ultra Mega Solar Power Projects' is a critical and transformative initiative aimed at harnessing the vast potential of solar energy to meet the growing energy needs of our country. This ambitious undertaking represents a comprehensive strategy to accelerate the deployment of solar power infrastructure, foster sustainable development, and address environmental concerns. Solar energy, as a clean and renewable resource, holds tremendous promise in mitigating climate change and reducing our dependence on fossil fuels. The 'Development of Solar Parks and Ultra Mega Solar Power Projects' program seeks to create an ecosystem that fosters the development of solar power projects on a massive scale. In this review, the Committee will delve into the key aspects of this initiative, including its objectives, the technologies and infrastructure involved, its economic and environmental impact, and the challenges and opportunities it presents.
2. The Solar Park is a concentrated zone of development of solar power generation projects, by providing to developers an area that is well characterized, properly infra-structured and where the risk of the projects can be minimized as well as the facilitation of the permitting process. Starting with the 'Charanka Solar Park' in Gujarat, and closely followed by the 'Bhadla Solar Park' in Rajasthan, Solar Parks have quickly emerged as a powerful instrument for the rapid development of Solar Power Projects in the country. These parks have obtained their initial impetus from the Jawaharlal Nehru National Solar Mission (JNNSM), which provided the policy framework and roadmap for solar power

development in the country. Charanka Solar Park in Gujarat is an example, envisioned as a pioneering first-of-its-kind large scale solar park in India with clear land and transmission connectivity. A solar power developer can get fully developed land along with transmission facilities and can, therefore, set up a power project immediately. The solar parks not only enable the States to meet their policy targets for solar power and renewable purchase obligations, they also contribute towards the ambitious targets put in place by the JNNSM. In addition, the clean power generated by these solar projects play a role for reducing India's carbon footprint, promote high end technical investments and empower local communities. MNRE, through this scheme envisaged development of similar solar park across India.

3. Large size projects have a potential to bring down the cost of Solar Power. Therefore, Ultra Mega Solar Power Projects, each having capacity of 500 MW or above have been planned in India. Major chunks of land are available in some States. There are some developers who are keen to take up very large projects. Land has been identified in Gujarat, Rajasthan, J&K (Leh and Kargil) and Madhya Pradesh etc.
4. On the environmental front, this review will examine how 'Development of Solar Parks and Ultra Mega Solar Power Projects' aligns with sustainability goals. Solar energy is inherently clean, producing no greenhouse gas emissions during its operation. By replacing traditional fossil fuel-based power sources with solar energy, the program contributes to reducing air pollution, conserving natural resources, and safeguarding ecosystems.

II. Solar Energy Potential

5. Given below is the Solar Energy Potential in the country, as furnished by the Ministry:

“Based on availability of land and insolation, National Institute of Solar Energy, an autonomous institute under aegis of this Ministry, has assessed the solar energy potential in the country.” List of State-wise solar potential, as submitted by the Ministry, is given at **Annexure-I**

6. The target of Solar Energy installation achieved in last 5 years as furnished by the Ministry of New and Renewable Energy in July, 2023, is given as under:

(a) Installed solar capacity increased by ~200% with addition of ~45 GW

(b) 70 GW solar projects has been bid out

(c) Important schemes & targets:

- Solar Park scheme – 40 GW
- PM-KUSUM scheme – 30.8 GW
- Residential Rooftop Solar Phase 2 – 4 GW
- CPSU scheme – 8.2 GW

(d) Solar PV manufacturing capacity

- Module capacity increased by 15 GW (150%)
- Cell capacity increased by 3 GW (100%)

7. However, the implementation of large-scale solar projects also comes with its set of challenges, such as land acquisition, grid integration, and resource availability. This review will provide insights into these challenges and potential solutions to address them.

Chapter-II

I. Solar Parks

1) (a) Concept of Solar Park

Solar parks, also known as solar energy parks or solar farms, are dedicated areas or facilities where large-scale solar photovoltaic (PV) or solar thermal systems are deployed to generate electricity from sunlight. These solar parks are designed to harness solar energy efficiently and contribute significantly to the production of clean, renewable energy. The concept of solar parks encompasses several key elements:

- i. **Large-Scale Solar Installations:** Solar parks are characterized by the presence of numerous solar panels or solar collectors, often covering vast expanses of land. These installations can vary in size, ranging from a few hectares to hundreds of hectares, depending on the capacity of the solar park.
- ii. **Optimal Sunlight Exposure:** Site selection is crucial for solar parks. They are typically situated in regions with high solar irradiance, where they can receive abundant sunlight throughout the year. This ensures that the solar panels can generate electricity efficiently.
- iii. **Efficient Energy Generation:** The primary purpose of solar parks is to generate electricity from sunlight. Solar panels or collectors in these parks convert solar energy into electricity through the photovoltaic effect (for PV systems) or by concentrating solar heat to produce steam (for solar thermal systems).
- iv. **Grid Integration:** Solar parks are connected to the electrical grid, enabling the electricity generated to be distributed to homes, businesses, and industries. Grid integration allows for a stable and reliable power supply.
- v. **Environmental Benefits:** Solar parks are environmentally friendly and produce clean energy. They have no direct emissions of greenhouse gases or air pollutants during operation, which helps mitigate climate change and reduce environmental impact.
- vi. **Economies of Scale:** Solar parks take advantage of economies of scale, making them cost-effective for electricity generation. By deploying a large number of solar panels in a centralized location, the cost per unit of electricity generated is often lower compared to smaller, distributed installations.

- vii. **Maintenance and Operation:** Maintenance and operation of solar parks involve regular cleaning, inspection, and repairs to ensure that the solar panels continue to function efficiently. This may include the replacement of faulty components or cleaning of dust and debris.
- viii. **Land Use Considerations:** Solar parks require a significant amount of land, which can raise land use and land management issues. These projects often involve land lease agreements or land acquisition, which need to be carefully managed.
- ix. **Community and Stakeholder Engagement:** Local communities and stakeholders often have an interest in solar park projects. Effective engagement and consultation with these groups are important to address concerns, ensure public support, and maximize the benefits to the community.
- x. Solar panels, which are made up of photovoltaic cells, are installed in rows and arrays on the ground or mounted on structures like trackers and fixed-tilt racks. These panels are designed to capture sunlight and convert it into electricity.

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2) There have been some recent Projects where floating Solar panels are also installed above water bodies, for instance, in Ramagundam, Andhra Pradesh. Concerns about their upkeep and maintenance are being addressed by the Ministry.

(b) Working of Solar Parks

- (i) **Solar Panels Installation**
- (ii) **Sunlight Absorption**

The solar panels absorb sunlight and convert it into direct current (DC) electricity through the photovoltaic effect. When sunlight strikes the photovoltaic cells, it generates an electric current.

(iii) Inverters

The DC electricity generated by the solar panels is then sent to inverters, which convert it into alternating current (AC) electricity. AC electricity is the standard form of electricity used for residential and commercial applications.

(iv) Power Distribution

The AC electricity generated by the inverters is then sent to a substation within the solar park. This substation contains transformers and other equipment to adjust the voltage of the electricity and ensure it's compatible with the electrical grid.

(v) Grid Connection

The electricity is then fed into the electrical grid. Solar parks are usually connected to the local or regional power grid, allowing the electricity generated to be distributed to homes, businesses, and industries in the surrounding area. The grid connection also enables excess electricity to be transmitted to other regions if needed.

(vi) Monitoring and Maintenance

Solar parks have monitoring systems in place to track the performance of the solar panels and ensure they are operating efficiently. Maintenance crews periodically inspect and clean the panels to ensure they continue to generate electricity at optimal levels.

(vii) Energy Storage

Some Solar Parks incorporate energy storage systems like batteries. These batteries store excess electricity generated during sunny days and release it during periods of low sunlight or at night, ensuring a more consistent power supply.

(viii) Environmental Considerations

Solar parks are designed to have minimal environmental impact. The land on which they are built may still be used for farming or other purposes, and efforts are made to mitigate

any ecological disruption. Additionally, solar energy generation produces no greenhouse gas emissions, contributing to a reduction in carbon emissions.

(c) Capacity of Solar Parks:

8. The capacity targeted for development of a Solar Park under the Scheme is in the range of 500 MW and above. However, smaller parks ~20 MW have also been allowed in hilly States in view of the difficult terrain and where there is shortage of non-agricultural land.

Chapter-III

Scheme and its Elements

9. The Scheme for "Development of Solar Parks and Ultra Mega Solar Power Projects" as submitted by the Ministry of New and Renewable Energy (MNRE) was rolled out on 12 December 2014 for setting up at least 25 Solar Parks each with a capacity of around 500 MW and above with a target of 20,000 MW of solar power installed capacity in a span of 5 years from 2014-15 to 2018-19. The capacity of the Scheme was then enhanced from 20,000 MW to 40,000 MW on 21 March 2017 to set up at least 50 Solar Parks by 2025-26. Total capacity when operational, will generate around 80 billion units of green electricity per year which in turn will lead to abatement of around 80 million tonnes of CO₂ per year over its life cycle. Therefore, the Scheme will significantly contribute to achieve the 'Panchamrit' targets regarding energy transitions announced by Hon'ble Prime Minister.

10. The program's core objectives include the establishment of Solar Parks, which are large-scale solar installations dedicated to harnessing solar energy efficiently, and the promotion of Ultra Mega Solar Power Projects, which are significant solar power ventures designed to cater to the energy demands of industries and regions. This multifaceted approach is expected to contribute significantly to increasing the share of renewable energy in the global energy mix and reducing greenhouse gas emissions. The Scheme aims to provide all the infrastructural requirements for Solar Power Projects created by a park developer so that Solar Project Developers can be set up expeditiously. This would also give impetus to solar energy generation and encourage project developers and investors in cost-reductions, technical improvements and achieving large skill target of Solar Power Development in the country. It would enable States to bring in significant investment from project developers, meet its Solar Renewable Purchase Obligation (RPO) mandate and provide employment opportunities to local population.

11. On being asked about the achievement of objectives of the scheme in the country, the Ministry submitted as under:

“The Government have sanctioned 50 Solar Parks with aggregate capacity of 37,990 MW in 12 States across the country, so far. Against this sanction, 11 solar parks with aggregate capacity of 8,521 MW have been completed and 7 Solar Parks with aggregate capacity of 3,985 MW have been partially completed. In these parks, Solar Projects of aggregate capacity of 10,237 MW have been developed.”

I. Highlights of the Scheme

12. Highlights of the Scheme are given as under:

- (a) **Solar Parks:** These are dedicated areas for solar power generation, typically on a large scale, where multiple solar panels and installations are deployed. They provide a consolidated and efficient approach to harness solar energy.
- (b) **Ultra Mega Solar Power Projects:** These are massive solar power projects that are designed to generate a significant amount of electricity, often catering to the energy needs of industries, regions, or even entire country.
- (c) **Technological Advancements:** The initiative leverages advanced solar technologies, such as high-efficiency solar panels, energy storage systems, and smart grid integration to ensure optimal energy generation and utilization.
- (d) **Economic Impact:** The program has the potential to create jobs, stimulate economic growth, and attract investments in the renewable energy sector. It can also contribute to reducing energy costs for consumers.
- (e) **Environmental Benefits:** Solar power is a clean and sustainable energy source that reduces greenhouse gas emissions and environmental pollution. The initiative aligns with sustainability goals by conserving natural resources and safeguarding the environment.
- (f) **Challenges:** The implementation of large-scale solar projects may face challenges such as land acquisition, grid integration, and resource availability. These challenges need to be addressed to ensure the success of the program.

13. Further, in this regard, the Ministry in their written reply submitted as under:

“The following Solar Parks have been inaugurated/dedicated to the nation/foundation stone laid by Hon’ble Prime Minister:

- (i) 750 MW Rewa Solar Park in Madhya Pradesh
 - (ii) 50 MW THDCIL project in Kasargod Solar Park, Kerala
 - (iii) 600 MW Jhansi Solar Park in Uttar Pradesh
 - (iv) 75 MW Solar Project at Mirzapur in UP Solar Park.
- Some of the world’s largest parks like 2000 MW Pavagada Solar Park in Karnataka, 1400 MW Anathapuramu Solar Park & 1000 MW Kurnool Solar Park in Andhra Pradesh, 1000 MW Bhadla Ph-III Solar Park in Rajasthan, 750 MW Rewa Solar Park in Madhya Pradesh have been developed under the scheme.
 - First Solar Park of capacity 20 MW has been developed in North-Eastern State of Mizoram.
 - Seven floating Solar Park of aggregate capacity 2039 MW have been approved.
 - Two largest solar parks of capacities 4750 MW and 3325 MW to be developed by NTPC Renewable Energy Ltd. and Gujarat State Electricity Corporation Ltd. (GSECL) respectively are approved under the scheme. These parks are part of the 30,000 MW RE park planned to be developed in Khavda of Kutch District of Gujarat for which foundation stone had been laid by Hon’ble Prime Minister.”

II. Criteria for selection of Solar Parks

14. As regards the criteria for sanctioning and setting up of Solar Parks, the Ministry has stated that the Quality of Solar radiation received at the place plays an important role in sanctioning of Solar Parks by the Ministry. When asked about the study if any, conducted by the Ministry to determine the Quality of Solar radiation in all the States of India, the Ministry submitted as under:

“Under Solar Radiation Resource Assessment (SRRA) project of this Ministry, a network of 115 automatic solar radiation monitoring stations has been set up across India. One of

the main aims of SRRA is to provide investment grade bankable solar radiation data to the solar industry, project developers, decision makers in the financing institutions & policy and also to the specific community. It is envisaged that this data will also be used for the improvement and validation of satellite-derived solar radiation data for India.

The project was completed in two phases, 51 stations in Phase-I (2011) and 60 stations in Phase-II (2014). All these SRRA stations are fully automatic, grid independent and records one second data and after integration transmits one-minute data to the Central Server. All stations identify and measure both solar (GHI, DHI & DNI) & weather parameters such as, temperature, humidity, pressure, rain, fall, wind speed and direction and also host of other derived parameters.

Under this project, National Institute of Wind Energy (NIWE) had prepared the **Solar Radiation Atlas**, a first of its kind combining satellite-derived data and the world’s largest high-quality network of simultaneously measured solar ground data available at https://maps.niwe.res.in/resource_map/map/solar/.”

State-wise data for solar insolation as provided by the Ministry is given as under:

“NISE has assessed the solar energy potential of about 750 GW in the country. NIWE has been entrusted to set up Solar Radiation Resource Assessment Stations and 121 stations have been set-up across the country. The State-wise details of solar insolation data (in Kwh/m²) are given at **Annexure-II**.

III. Timelines for Development of Solar Park:

15. The Ministry has submitted the following information about the timeline for development of Solar Parks:

Sl. No.	Milestone	Timelines
1.	Date of issue of in-principle approval	Zero Date
2.	Submission of Detailed Project Report (DPR)	4 months from zero date
3.	Land acquisition (not less than 50% land acquired)	8 months from zero date

Sl. No.	Milestone	Timelines
4.	Financial Closure	11 months from zero date
5.	Award of work for pooling stations	14 months from zero date
6.	Receipt of material on site for pooling stations	17 months from zero date
7.	Completion of construction of pooling stations & land development	24 months from zero date

IV. Financial Model of the Scheme

16. The Solar Power Park Developers (SPPDs) are entrusted with developing the Solar Parks, developing the land and providing necessary infrastructure like road connectivity, transmission infrastructure etc. Significant investment is also to be made in the operation & maintenance of the Solar Park, employing staff and other activities etc. The entire cost of development including cost involved in acquisition of land forms the total cost of the project for which an estimate is prepared beforehand by the SPPD. Based on this estimate, the SPPD formulates a recovery model which includes:

- i. One-time development charges on per MW basis;
- ii. Recurring charges like O&M charges, land lease, etc;
- iii. Central Financial Assistance (CFA) from MNRE; and
- iv. Debt, depending on the availability and requirement of funds.

17. On being asked about the components included in the recovery model, the Ministry has furnished the following information:

“The SPPDs entrusted with development of the park will develop the land/water body and provide necessary infrastructure like road connectivity, transmission etc. They will also be responsible for operation & maintenance of the park.

Accordingly, the SPPD prepares an estimate for the cost of development of the park. The Central Financial Assistance (CFA) amount admissible from MNRE is deducted from the estimated cost and the balance amount is recovered from the Solar Project Developers to whom the plots in the park are being allotted. Charges are also recovered from the Solar Project Developers for regular maintenance of the park in the form of Operation and Maintenance charges.”

18. Further, detailing about the financial model of the Solar Parks, the Ministry has submitted:

“Projects inside Solar Parks are set up either under Developer Mode or under EPC Mode or any combination of both. The cost of Park Development is recovered by the SPPDs from:

- One-time up-front development charges on per MW basis as advance from the SPDs.
- CFA received from MNRE.
- The SPPD may also put in some equity or can raise loan, depending on the availability of funds and requirement.
- The SPPD also collects recurring charges like land lease, O&M charges etc. for maintenance of the Parks.

In most cases, the Park Developer collects one-time up-front development charges from the project developers selected through competitive bidding process and develops the park.”

V. MNRE Support:

19. When asked about the financial support being given by the Ministry of New and Renewable Energy for SPPDs, the Ministry in its written replies has stated as follows:

“The SPPD is provided a CFA of up to ₹25 Lakh for preparing Detailed Project Report (DPR) of the Solar Park, conducting surveys etc. The CFA for preparation of DPR is provided based on capacity of the Solar Park and is given as under:

Sl. No.	Capacity range of Solar Park	CFA for preparation of DPR (in ₹)
1.	Up to 100 MW	Up to ₹ 10 lakh
2.	More than 100 MW & up to 500 MW	Up to ₹15 lakh
3.	More than 500 MW	Up to ₹25 lakh

20. Further, the Ministry has clarified that in addition, CFA of ₹ 20 lakh/MW or 30% of the project cost including Grid-connectivity cost, whichever is lower, is provided for development of the Solar Park infrastructure. The mode-wise CFA pattern provided under the scheme is given as under:

Mode for selection of SPPD	CFA
Mode-1	₹12 lakh/MW for internal infrastructure to SPPD & ₹8 lakh/MW for external infrastructure to CTU/STU Or 30 % of the project cost, whichever is lower
Mode-2	
Mode-3	
Mode-4	
Mode-5	
Mode-6	No CFA
Mode-7	₹20 lakh/MW to CTU/STU for external infrastructure only Or 30% of the project cost, whichever is lower
Mode-8	₹20 lakh/MW for internal infrastructure only to SPPD (Transmission costs are socialised) Or

Mode for selection of SPPD	CFA
	30 % of the project cost, whichever is lower

21. When queried about the Milestone for release of CFA to SPPDs and CTUs/STUs, the Ministry has stated the following:

(b) Milestones for release of CFA to SPPD:

Sl. No.	Milestone	% of subsidy disbursed
1.	Land acquisition (not less than 50% land acquired)	20%
2.	Financial Closure	20%
3.	Award of work for pooling stations	20%
4.	Receipt of material on site for pooling stations	25%
5.	Completion of construction of pooling stations & land development	15%
Total		100%

(c) Milestones for release of CFA to CTU/STU:

Sl. No.	Milestone	% of subsidy disbursed
1.	On award of work	50%
2.	On receipt of material at site and upon verification by SECI	20%
3.	On successful commissioning	30%
Total		100%

VI. Central Financial Assistance

22. When asked about disbursement of Central Financial Assistance (CFA) both for DPR and for achieving the milestones for different Solar Parks, the Ministry has furnished the following information:

“The park-wise details of CFA disbursed both for DPR and for achieving the milestones of the Solar Projects are given at **Annexure-III**

23. On being asked about the details of Expenditure incurred under the Scheme, the Ministry has submitted as under:

“The Solar Park Scheme is one of the schemes under the budget head: Grid-Interactive Renewable Power (Solar Power) which includes several other schemes of this Ministry. Therefore, no separate budget allocation is made for the Solar Park Scheme. The year-wise details of expenditure made under the Scheme from 2014-15 onwards are given at **Annexure-IV**

VII. Scheme Implementing Agency:SECI

24. The successful execution of the 'Development of Solar Parks and Ultra Mega Solar Power Projects' initiative relies significantly on the presence of a capable and efficient Scheme Implementing Agency. This Agency plays a pivotal role in coordinating, facilitating, and monitoring the various aspects of this ambitious program.

25. As regards the Scheme Implementing Agency, Ministry of New and Renewable Energy in its written replies submitted as under:

“The agency for implementing the scheme is Solar Energy Corporation of India (SECI). SECI implements the scheme and handles fund being made available under the scheme on behalf of Government of India. Further, Indian Renewable Energy Development Agency Limited (IREDA) acts as the implementing agency for the parks being developed by SECI.”

26. On being asked about the reasons for designating IREDA as an implementing agency of the Scheme for the Solar Parks being developed by SECI, Ministry of New and Renewable Energy has submitted as under:

“SECI is the nodal agency for implementing the Scheme, responsible for due diligence of various activities as per the guidelines of the Scheme, and also responsible for handing the funds. SECI is also developing Solar Parks in the role of SPPD and this creates a situation where, SECI as the implementing agency of the Scheme has to undertake the due diligence process for its own Parks. In order to avoid such conflict of interests, IREDA has been designated as the implementing agency only for the Solar Parks being developed by SECI.”

VIII. Modes for selection of SPPDs

27. When asked about the various modes for selection of SPPDs, Ministry has submitted as under:

“The States/UTs, where park is to be developed, designates an agency for the development of Solar Park, termed as Solar Power Park Developer (SPPD). Depending upon type of park developers and land availability, 8 Modes have been introduced from time to time for park development. Most parks have been sanctioned under Mode-8.

The details of these modes are as under:

Mode	Brief
Mode-1	The State designated nodal agency undertakes development & management of Solar Park.
Mode-2	A 50-50 JV is set up between State designated nodal agency and SECI for development & management of Solar Park.
Mode-3	The State designates SECI as the nodal agency.
Mode-4	Private entrepreneurs promote Solar Parks with or without equity

Mode	Brief
	<p>participation from the State Government or its agencies.</p> <p>Mode 4A: If the land is provided by the State Government or any State Government agency, then the SPPD may be selected based on open bidding on development and O&M charges.</p> <p>Mode 4B: If the land is arranged by the SPPD, then the SPPD may be selected based on open bidding on developed land and O&M charges.</p>
Mode-5	<p>Mode 5A: CPSUs having its own land or land taken on lease/right to use basis may develop the park either on its own or through EPC mode. Further, the CPSU may set up the power plants with its park either through EPC mode or by calling bids for developers.</p> <p>Mode 5B: CPSUs having its own land or land taken on lease/right to use basis may select SPPD based on open bidding on development and O&M charges.</p> <p>Mode 5C: In case the CPSU does not have land then the CPSU may float tender for setting up solar park by any third party having its own land. Also, the bidding for selection of SPPD would be based on his quoted price of developed land per MW and the O&M charges.</p>
Mode-6	Solar Park by private entrepreneur without CFA.
Mode-7	SECI will act as the SPPD and arrange land from both Government and private parties. The project developers are selected through competitive bidding process. The park development activities and costs are under the scope of project developer and the entire CFA is made available to set up external evacuation infrastructure.
Mode-8	CPSU/State PSU/Government organization/their subsidiaries or the JV of above entities can act as SPPD. The entire CFA is made available for setting up of internal infrastructure only. Transmission costs are socialized.

28. Mode-wise Details of Approved Solar Parks as furnished by the Ministry (in MW) is given at **Annexure-V**:

29. On being asked about the reasons for Mode 8 being most attractive than other Modes for park development, Ministry has furnished the following information:

“In order to expedite development of Solar Parks and encourage the State Governments to facilitate the SPPDs in acquisition of land and in obtaining necessary clearances etc., a new Mode (Mode-8) was introduced. A total of 29 Solar Parks of aggregate capacity of over 24 GW have been approved under this Mode. The Mode-8 is comparatively attractive for the following reasons:

- i) The entire CFA of ₹ 20 Lakh/MW or 30% of the cost of development of the park is provided for development of internal infrastructure of the park.
- ii) Any augmentation/strengthening and/or creation of external power evacuation infrastructure may be done by CTU and therefore, its cost will be socialized.
- iii) A facilitation charge of ₹0.05/unit of power being generated from the projects in the parks is provided to the States in order to encourage the State Governments to provide necessary assistance to the SPPDs in identification & acquisition of land, to facilitate in obtaining all required statutory clearances etc.
- iv) The SPPD or any of its individual promoters having trading license, may act as a trader of power being produced in the park, for which they would be entitled to claim a margin of ₹0.07 /unit.”

30. All the States and Union Territories are eligible for getting benefit under the Scheme. The Solar Parks are developed by the State Governments & their agencies, CPSUs and private entrepreneurs or joint ventures of any of them. The implementing agency is termed as Solar Power Park Developer (SPPD) and are selected in any of the eight modes as per the Solar Park Scheme.

31. Key Responsibilities of SPPD, as furnished by the Ministry are as under:

“The activities that are essential for the SPPD are as under:

1. Acquisition of land;
2. Getting land related all clearances and plotting of land;
3. Developing approach road to the Solar Park and access road to each plot;
4. Developing internal transmission system, pooling station(s) and transmission lines from pooling station(s) and maintaining it;

5. Making arrangement to connect to the grid i.e., ISTS or State Transmission Network;
6. Flood mitigation measures like flood discharge, internal drainage etc.;
7. Required power during construction;
8. Telecommunication facilities;
9. Providing water supply for solar panel cleaning and other application. They are also advised to minimize water usage by employing robotic or dry cleaning.”

Details of Solar Projects Developers (SPDs) inside Solar Parks (as on 30-09-2023) as furnished by the Ministry is attached at **Annexure-VI**

IX. Details of solar Parks approved

32. On being asked as to how the Ministry ensured that the sanctioned Solar Parks are completed within the stipulated time period, Ministry in its replies stated as under:

“As per the Scheme guidelines, the parks are to be completed within a period of 2 years from date of in-principle approval. However, while implementing the scheme, it is experienced that due to innate challenges in developing the park, the timeline of implementation is generally longer.

Giving due consideration to the challenges being faced by the park developers, Ministry makes all efforts to resolve the issues and also granted extension from time to time wherever required.

Further, in order to expedite the pace of development of Solar Parks, the Central Public Sector Undertakings (CPSUs) have been engaged by introducing a new mode (Mode-8) for implementation. A facilitation charge of ₹0.05/unit of power being generated from the projects in the parks is also provided to the States Governments in order to encourage the States to provide necessary assistance to the Solar Power Park Developers (SPPDs) in identification & acquisition of land, to facilitate in obtaining all required statutory clearances, monitoring the progress, fixing the park charges, etc. This facilitation charge is paid only on the quantum of power that is exported outside the state from that park and only if no such charge is levied under the State Government policy. A total of 28 Solar Parks of aggregate capacity of over 24 GW have been approved under this mode.”

The list of approved/installed Solar Parks as submitted by the Ministry is given at **Annexure-VII** :

X. Present Status of implementation of the Scheme

33. The details indicating present status of the Scheme as furnished by the Ministry is given below:

- Capacity approved : 37,990 MW (50 Parks in 12 States)
- Projects commissioned inside Solar Parks : 10,237 MW
- Land allotted/acquired : 1,73,000 acres
- Major Parks developed and its capacity
- Pavagada Solar Park (2000 MW)
- Ananthapuramu-I Solar Park (1400 MW)
- Bhadla-III Solar Park (1000 MW)
- Kurnool Solar Park (1000 MW)
- Rewa Solar Park (750 MW)
- Bhadla Ph-II Solar Park (680 MW)

Major Parks under development and its capacity:

- NTPC REL RE Park (4750 MW)
- GSECL Park (3225 MW)
- GICPL Parks (2375 MW)
- RRVUNL Park (2000 MW)
- RSDCL Parks (2000 MW)
- Jalaun Parks (1200 MW)

Chapter IV

Challenges and other issues

34. When asked about the reasons for lagging behind the target of 20000 MW of Solar Power installed capacity by 2018-19 and again commissioning of only 10,137 MW of projects so far, which is far below the set targets, the Ministry in their written replies stated as follows:

“The pace of implementation of the scheme was hampered due to various reasons like delay in acquisition of clear land, conflicts while acquiring land leading to court cases, tying up of Power Purchase Agreements (PPA), Great Indian Bustard (GIB) issue, refusal by State Electricity Regulatory Commissions (SERCs) to approve tariffs even when such tariffs have been discovered through tariff based competitive bidding and lack of interest in the scheme by some State Governments.

Despite these challenges, Ministry managed to set up 10,237 MW solar projects in various Solar Parks. It is also submitted that the Ministry had cancelled few Solar Parks on account of slow progress or on requests of the State Governments. It is also mentioned that out of the 20 thousand MW sanctioned under Phase-1 of the Scheme, 17 Solar Parks with aggregate capacity of 12,171 MW are currently active, in which Solar Projects of 9891 MW have been set up in 15 Solar Parks.”

Details of the Solar Parks, which are yet to be commissioned are given at Annexure-VIII.

35. On being asked as to whether the completion of the said Scheme is likely to be achieved within the fixed timelines, the Ministry submitted as follows:

“The time line of the Solar Park scheme has been extended till March, 2026. As per the scheme guidelines, the parks are to be completed within a period of 2 years from date of

in-principle approval. However, while implementing the scheme, it is experienced that due to innate challenges in developing the park, the timeline of implementation is generally longer.

Giving due consideration to the challenges being faced by the park developers, Ministry makes all efforts to resolve the issues and also granted extension from time to time wherever required.

Further, in order to expedite the pace of development of Solar Parks, the Central Public Sector Undertaking (CPSUs) have been engaged by introducing a new mode (Mode – 8) for implementation. A facilitation charge of ₹ 0.05/unit of power being exported outside the host State from the projects in the parks is also provided to the State Governments, in order to encourage the States to provide necessary assistance to the Solar Power Park Developers (SPPDs) in identification & acquisition of land, to facilitate in obtaining all required statutory clearances, monitoring the progress, fixing the park charges, etc. This facilitation charge is paid only on the quantum of power that is exported outside the state from that park and only if no such charge is levied under the State Government policy. A total of 25 Solar Parks of aggregate capacity of over 23 GW have been approved under this mode.”

I. Challenges in implementation of Solar Parks

36. The major challenges in implementing the scheme inter-alia involve the acquisition of clear land, mismatch in timelines between solar projects and power evacuation infrastructure, environmental issues like Great Indian Bustard (GIB) issue in Rajasthan and Gujarat; regulatory challenges in States (example – Andhra Pradesh, Gujarat) like non-approval of solar tariff by SERCs even after the tariff is discovered through competitive bidding process, on the pretext of lower tariff discovered in other States. Further, some States are not taking keen interest in developing the Solar Parks. The COVID pandemic had also decelerated the pace of implementation to considerable extent.

37. When asked about the challenges/issues being faced during the development of Solar Parks, the Ministry in their written replies has submitted the following:

- (i) **Land:** Land is a very critical input for development of Solar Park. The requirement of land is approximately 4-5 acres per MW for the setting up of Solar Parks. Land for the setting up of Solar Park is generally identified by the State/UT Government unless the SPPD has its own land. The States are encouraged to identify sites receiving good solar radiation and sites which are closer to CTU/STU, preferably locations with spare transmission capacities and water availability. The private entrepreneurs selected by the State Government as SPPD are free to arrange their own land for setting up the Solar Park. Land is generally taken on long term lease from Government as well as private sources. The acquisition of land for Solar Park is one of the biggest challenges.
- (ii) **Difference in gestation period between solar parks and transmission infrastructure:** The gestation period of development of Solar Park is ~ 24 months, while the creation of transmission infrastructure requires~36-48months. Therefore, matching the implementation period of both the systems is a real challenge. The identification of RE potential zones and planning for transmission infrastructure accordingly has addressed this challenge to a considerable extent.
- (iii) **Forest issues:** The earlier planned common transmission system for Barethi Solar Park (630 MW) and Chhatarpur Solar Park (950 MW) was falling under Panna tiger reserve. Subsequently, separate sub-stations were planned for both the parks.
- (iv) **Imposition of BCD:**In some Solar Parks such as Kalpi Solar Park (65 MW) and NHPC Solar Park in Odisha (40 MW), the work has stalled subsequent to imposition of BCD, due to rise in imported module costs.
- (v) **Sub-judice matters:** In Solar Parks such as Dholera Solar Park (1000 MW) in Gujarat and Kadapa Solar Park (1000 MW) in Andhra Pradesh, solar projects of 700 MW and 750 MW respectively are subjudice before APTEL, due to non-adoption of tariff by State regulators, even after the tariff was discovered through competitive bidding.
- (vi) **Tariff approval issues:** Refusal to approve tariffs in floating Solar Parks in Kerala, Odisha, Madhya Pradesh as the tariffs discovered were higher in comparison to the ground-mounted solar projects.

(vii) **GIB issue:** The progress of Phalodi-Pokaran Solar Park (750 MW) and Nokh Solar Park (925 MW) were hampered due to GIB issue in Rajasthan.

The COVID-19 pandemic had a significant impact on various sectors, including renewable energy. During the pandemic, the Solar Park development in India faced several challenges, including Labour and Supply Chain Disruptions, Administrative and Regulatory Delays, etc.

38. As per the information furnished by the Ministry, Land is stated to be a very critical input for development of Solar Park. Out of 2.2 Lakh acres of land identified, around 1.6 lakh acres have been acquired/ allotted for approved Solar Parks. When asked about evolving a policy for utilizing the huge land parcels available with various Ministries/ Central Government PSUs for achieving the targets of development of Solar Parks, the Ministry has stated:

“The Solar Park Scheme encourages possibility of utilizing areas like cold and hot deserts, water surface in big reservoirs, canal bunds and sides of highways for setting up of Solar Parks, if found suitable. Under this Scheme, various CPSUs are already utilizing land/water bodies available with them, for setting up of Solar Parks.”

39. When asked about the details of the sanctioned Solar Parks that are facing issues in acquisition of land, the Ministry has stated:

“The issue related to acquisition of land have been observed in many Parks. The list of such Parks is given at **Annexure-IX**.

II. Steps taken/proposed to address the challenges

40. On being asked the measures taken to overcome the challenges being faced in implementation of the scheme, Ministry has stated:

“Though Solar Park has various benefits like assured availability of developed land & necessary infrastructure, power evacuation facility etc., it has some inherent issues and challenges and the Ministry has taken initiatives as given below:

(i) **Land:** In order to overcome this issue, a new mode (Mode-8) of implementation was introduced in June'2020 with a provision to incentivize the States for providing necessary assistance to the Solar Power Park Developers (SPPDs) in identification & acquisition of land, to facilitate in obtaining all required statutory clearances, monitoring the progress, fixing the park charges etc.

A facilitation charge of ₹ 0.05/unit is provided to the States Governments for the quantum of power being exported outside the State from the projects in the Park.

(ii) **Difference in gestation period between solar parks and transmission infrastructure**

The identification of RE potential zones and planning for transmission infrastructure accordingly has addressed this challenge to a considerable extent. MNRE in coordination with Ministry of Power, CEA, CTU and States is making concerted efforts to complete the Green Energy Corridor (GEC) and other transmission projects timely so that renewable energy projects do not have to suffer due to lack of reliable evacuation/transmission Infrastructure. Efforts are also made to match the timelines between park development and power evacuation infrastructure development through meetings with the concerned stakeholders.

(iii) Through various review meetings with all stakeholders and written communications efforts are being made by the Ministry to resolve the above issues in order to streamline development of Solar Parks.”

41. On being asked about the Steps taken by the Ministry for expediting the development of Solar Parks and as to how the Ministry's intervention has helped in reducing this problem, the Ministry in their written replies has stated:

“There are various challenges and issues arising during development of Solar Parks. The Ministry makes efforts to resolve these issues for expeditious implementation of Solar Parks. The Park-wise major issues and interventions made by this Ministry are at **Annexure-X:**

III. Solar Parks in Hilly States

42. Ministry has informed that the capacity for development of a Solar Park as per the Scheme was in a range of 500 MW and above. However, 5 smaller parks of approx. 20 MW have also been allowed in hilly States in view of the difficult terrain and where there is shortage of non-agricultural land.

43. On being asked about the reasons for slow progress of installation of Solar Parks in hilly States, the Ministry has replied as follows:

“Although there is potential for setting up of solar PV projects in hilly States including NE region, the tariff discovered there, is comparatively higher due to lower insolation, difficult terrain and higher logistic costs. Therefore, DISCOMs seem to be not very keen to procure solar power at discovered tariff. A Solar Park of capacity 20 MW in Meghalaya was approved by MNRE in 2015. The tariff discovered in the park was not acceptable by the local DISCOM and the Solar Park was eventually cancelled by MNRE in 2022. Similarly, another Solar Park of capacity 20 MW in Manipur was also cancelled in 2022, due to very slow progress. One Solar Park of 20 MW capacity has been successfully commissioned in Mizoram and is operational.”

IV Floating Solar parks

44. Floating solar parks, also known as floating solar farms or floating photovoltaic (FPV) systems, are a type of solar power generation facility where solar panels are installed on bodies of water, such as lakes, reservoirs, ponds, and even the sea. Floating solar parks are gaining popularity as a viable renewable energy solution, particularly in regions with limited available land for conventional solar installations. These systems provide a way to harness solar energy efficiently while conserving land and offering potential benefits for water management and aquatic ecosystems.

These innovative solar installations offer several advantages and come with their own set of unique features:

- (i) **Solar Panel Installation:** Solar panels used in floating solar parks are typically mounted on floating platforms or structures that can support the weight of the panels. These platforms can be anchored or tethered to prevent drifting.

- (ii) **Increased Efficiency:** Water bodies often have a cooling effect on solar panels, which can help improve their efficiency. This is because solar panels tend to overheat when installed on land, and elevated temperatures can reduce their output. The cooling effect of water helps maintain a more optimal temperature for solar panels.
 - (iii) **Land Conservation:** Floating solar parks can be deployed without using valuable land resources. This is especially important in densely populated areas where land is at a premium or when the water body is already in use for other purposes, such as irrigation or recreation.
 - (iv) **Reduction in Evaporation:** In regions with water scarcity, floating solar panels can help reduce water evaporation from the surface of reservoirs and ponds, which can be a side benefit in addition to electricity generation.
 - (v) **Improved Water Quality:** The shade provided by the floating panels can reduce the growth of algae and other aquatic plants, improving water quality and reducing the need for chemical treatments in some cases.
 - (vi) **Environmental Considerations:** When designed and managed responsibly, floating solar parks can have a minimal environmental impact. Careful planning is essential to mitigate any potential disruption to aquatic ecosystems.
 - (vii) **Grid Connection:** Just like traditional solar parks, floating solar parks are connected to the electrical grid, allowing the electricity generated to be distributed to homes and businesses.
 - (viii) **Floating Solar Farms in Different Water Bodies:** Floating solar installations can be deployed on a variety of water bodies, including natural lakes, artificial reservoirs, wastewater treatment ponds, and even the open sea. The choice of water body depends on local conditions and requirements.
45. The Ministry has approved 7 Floating Solar Parks with a total capacity of 2039 MW in various States out of which none have been commissioned so far. When asked about the steps taken to fast track the Floating Solar Parks struck at various phases, the Ministry has submitted as under:

“The cost of floating Solar PV projects is higher in comparison to the ground-mounted solar PV projects, due to the cost of the floatation system. Therefore, the tariff discovered is also higher, which is often not accepted by the DISCOMs. This ultimately delays the park development. However, in order to fast-track the development of Solar Parks including floating Solar Parks, Ministry conducts various meetings to address the issues faced by the park developers.”

V Monitoring Mechanism

46. Effective monitoring of solar parks is crucial to ensure optimal performance, reliability, and safety of the solar power generation system.

An effective monitoring mechanism for solar parks not only ensures efficient energy generation but also extends the lifespan of the system, reduces maintenance costs, and helps in meeting performance and compliance standards. It is essential for maximizing the return on investment and contributing to the success of renewable energy projects.

When asked about the existing monitoring mechanism for effective implementation of the different components of the Scheme, the Ministry has stated:

“The Solar Parks are monitored regularly based on the progress reports received from the SPPDs on a monthly basis. Further, review meetings are also held with the park developers, transmission utilities & the corresponding States to review the progress and address their issues from time to time. Field visits are also carried out by MNRE/SECI officials to find out the on-site progress.

In addition, the States have been advised to form a Committee headed by the Principal Secretary/Secretary (Power/Energy/Renewable Energy) of the State Governments having members from CEO of SPPD, head of the SNA and three experts in the field of renewable energy and power system to monitor the progress of the Park, address the issues arising in implementation of the Solar Park Scheme, fixing of park development charges etc.”

OBSERVATIONS/RECOMMENDATIONS

1. The Committee note that India, endowed with a huge solar energy potential, could be a game changer in mitigating the ill-effects of fossil fuel use. The Scheme to establish Solar Parks and Ultra Mega Solar Power Projects by Ministry is a critical step in right direction. The MNRE, being nodal Ministry, has to put in concerted efforts so that solar energy surges as the main renewable energy source in the times to come. The Committee observe that there is significant potential for Solar Energy generation under Mode 8 of the Scheme which entails collaboration with CPSU/State PSUs/Government organizations/their subsidiaries or the Joint Ventures. The Committee note with the approval of total of 29 Solar Parks having aggregate capacity of over 24 GW, only 9.3 GW has been actually commissioned. Taking cognizance of the gap between actual and approved capacity, the Committee urge the Ministry to devise a stringent mechanism through which delays are minimized/eliminated at the first place itself. The Ministry should keep periodic check (say quarterly or so) on different stages of development of solar parks so that the time lapse of setting up and commissioning of solar parks are minimized. The Committee would like to be apprised of the previous interventions, the Ministry made in the past and the ways and means through which it would continue to strengthen the process of setting up of solar parks. Therefore, the Committee stress upon to have effective monitoring and review mechanism at senior level so that the targeted capacity could be achieved within the timeline.

2. The Committee observe that the land constitutes the crux in the development of Solar Parks. The requirement of land is approximately 4-5 acres per Megawatt (MW) for setting up of Solar Parks. Land for the setting up of Solar Park is generally identified by the State/UT Government unless the SPPD has its own land. The Ministry in their written submission has stated that out of 2.2 Lakh acres identified, around 1.73 lakh acres have already been acquired/ allotted for approved Solar Parks. Further, the Committee have been informed that a total of 19 Solar Parks with an approved capacity of 9596 MW are facing several challenges in acquirement of land including issues such as legal disputes and delay in land

allocation by State Governments. The Committee strongly feel that assisting State Governments in providing fair and timely compensation to land owners would provide a great boost to the solar park developers alongwith ensuring ease in getting environmental clearances. The Committee, therefore, urge the Ministry to take up the matter with the State Governments so as to ensure acquisition of land in a time bound manner. The Committee also suggest the Ministry to set up a monitoring Unit/Cell at the highest level for having issues of stakeholders and keeping a regular check on Solar Park Developers.

3. The Committee note that, under the solar park scheme, CPSUs/SECs are primarily the implementing agencies, designated to establish 7 solar parks of a combined installed capacity of 5970 MW. Taking cognizance of the fact that generation/transmissions are yet to begin from these 7 solar parks, the Committee feel that MNRE being the nodal Ministry has to take up the responsibility of dedicated leadership in a way to sensitize/ motivate CPSUs like NTPC, NHPC, SECI etc. so that the latter gear up their operations. The Committee firmly believe that with combined efforts the timeline for setting up of solar parks shall be achieved without any further delays. The Committee would like to be apprised of the steps taken in this regard.

4. The Committee note that the total amount for CFA is estimated to be ₹ 4,050 crore, yet only ₹ 1803.79 crore have actually been disbursed till date. The Committee find such low disbursement as one of the major bottlenecks in the development of solar parks. For the setting up of solar parks, Central Financial Assistance (CFA) up to ₹ 25 lakh per Solar Park for the preparation of Detailed Project Report (DPR) is provided by the Ministry. Additionally, CFA upto ₹ 20.00 lakh per Megawatt or 30% of the project cost, including Grid-connectivity expenses, whichever is lower, upon achieving the specified project milestones is also prescribed in the Scheme. Further, Solar Energy Corporation of India Ltd. (SECI) disburses the approved grant in line with these milestones. The Committee would like to urge the Ministry to analyse the reasons associated with lower disbursements. A strong fund flow is imperative for successful development of any project and the Committee would like the Ministry to put in place an inherent

system of audit wherein reasons for low disbursements are highlighted and the Ministry is in a position to take timely remedial measures for the same. They would like to be apprised of the steps taken in this regard.

5. The Committee further find that one of the major constraints in timely commissioning of Solar Parks is the difference in gestation period between development of Solar Parks and transmission infrastructure. The gestation period of development of Solar Park is 24 months, whereas the construction activities of transmission infrastructure require 36 to 48 months. This incongruity results in delays in the development of Solar Parks. The Committee are informed that the Ministry is taking several steps such as identification of Renewable Energy (RE) potential zones, planning for transmission infrastructure accordingly etc. Additionally, MNRE in collaboration with the Ministry of Power, Central Electricity Agency (CEA), Central Transmission Utility (CTU) and the States has initiated steps to complete the Green Energy Corridor (GEC) and other transmission projects on time. The objective is to ensure that Solar Parks do not have to suffer from lack of reliable evacuation and transmission Infrastructure. The Committee desire to be informed about the latest progress made in development of transmission infrastructure like Green Energy Corridor etc. Furthermore, the Committee strongly recommend the speedy construction of Intra-State and Inter-State transmission systems to facilitate the efficient transfer of power generated from Solar Parks. The Committee also urge for setting up of Solar Energy Management Centers (SEMCs) to enhance forecasting of Solar Power generated from Solar Parks. These centres would also support grid operators in managing the variability and intermittency inherent in renewable power sources.

6. The Committee have been informed that one of the challenges to meet the target of 40 GW by 2023-24 is delay in finalizing Power Purchase Agreements (PPAs) between SPPDs and States/DISCOMS after finalization of tenders. This delay can be attributed to several factors, including lack clear directions from parent Ministry, a protracted internal approval process, involvement of multiple Ministries, lack of prior experience within the Government Departments etc. The potential consequences of this situation are multifaceted including delay in project

implementation, changes in scheme regulations, costs and incentives, developers withdrawing from projects and financial losses for the entities involved. Taking a serious view of this situation, the Committee recommend the Ministry to establish a single window system which would minimize the complexities of internal approval process reducing the involvement of multiple Ministries. The Committee firmly hold that the Ministry should collaborate with specialized agencies to develop standardized model formats for PPAs and fix definite time period for different levels of approval. These models can serve as templates, simplifying the negotiation process and expediting the overall execution of Solar Power Projects.

7. The Committee note that several Solar Projects are stalled due to refusal by State Electricity Regulatory Commissions (SERCs) to approve tariffs, even when such tariffs have been determined through tariff based competitive bidding. Additionally, certain Solar Parks like Dholera Solar Park (1000 MW) in Gujarat and Kadapa Solar Park (1000 MW) in Andhra Pradesh are currently under litigation in the Appellate Tribunal for Electricity (APTEL), leading to further delays in completion of Solar Projects. While Ministry have statedly tried to resolve the matter through various communication and review meetings at the highest level but the matter is yet to be resolved. In light of these challenges, the Committee feel that the Ministry need to find a permanent solution to this problem and explore the possibility of implementing alternative dispute resolution mechanisms, such as arbitration and reconciliation forum to enable the stakeholders to reach at mutually agreed solution; in a bid to avoid project delays.

8. The Committee have observed that several Solar Projects like Kalpi Solar Park (65 MW) have been delayed because Solar Power Project Developers (SPPDs) are facing difficulties in acquiring Solar modules and Solar photovoltaic with a capacity of (PV) Cells due to levy of Basic Customs Duty(BCD). Further, on 09.03.2021, Ministry issued an Office Memorandum announcing the imposition of Basic Customs Duty on solar cells and modules. As per this announcement, w.e.f. 1 April, 2022, any import of solar PV modules would attract 40% basic Customs Duty (BCD), while the import of solar PV cells would have a 25% BCD. The Committee understand that these high import duties were imposed to reduce the

influx of cheaper Solar components from China and to promote the domestic production of those items. To encourage the growth of the domestic Solar module industry, the Government also introduced a Production-Linked Incentive (PLI) scheme. However, despite these measures, the domestic industry has not yet reached its full potential, and the combination of high import duties and the Approved List of Modules and Manufacturers (ALMM) has led to a shortage of modules in the country, impacting ongoing solar projects. The Committee strongly hope that the matter should be taken up with the Ministry of Finance on an urgent basis. Since the BCD rates need to be reevaluated, and a more balanced approach has to be taken to ensure that stalled Solar Projects are completed according to their planned timelines, the Committee would like to be apprised of the progress made in this regard.

9. The Committee observe that India has made significant progress in its Solar (PV) manufacturing capacity with 6 GW for solar PV Cells and approximately 38 GW for solar PV modules. This represents a substantial increase from 2020 when India had the solar cell capacity of 3 GW, which has doubled to 6 GW as of March 2023. Similarly the solar PV module capacity, meanwhile, has grown from 15 GW to 38 GW during the same period of time. The Committee appreciate that Ministry has taken significant steps such as creating “favorable” policy environment by introducing the PLI scheme, and establishing a list of approved modules and manufacturers. These measures have played a pivotal role in doubling India’s solar cell and PV module capacity since 2020. These measures are expected for prospering domestic Solar manufacturing industry towards achieving 110 GW of solar PV module capacity by fiscal 2026, with an additional 72 GW of new manufacturing capacity set to come up within the next three years. This substantial expansion will establish self-sufficiency and make India the second-largest PV manufacturing country globally following China. Nevertheless, to further strengthen domestic manufacturing, the Committee feel that additional steps are required to be initiated and therefore recommend that Government should consider extending the existing PLI scheme to cover other ancillary

components, such as glass and ethylene vinyl acetate which are used in Solar panel lamination. There need to be sufficient incentives to encourage electricity consumption among solar PV manufacturers, alongwith subsidies to support the initial capital costs involved in setting up production facilities. The Committee also desire that the exemptions from excise duty and Zero import duty on raw materials should be implemented to reduce the manufacturing costs. The Ministry should also work on providing Viability Gap Funding (VGF) and low interest rate loans to domestic manufacturers to enhance their financial viability.

10. The Committee are well aware of the challenges being faced by several Solar Parks in Rajasthan such as Phalodi-Pokaran Solar Park (750 MW) and the Nokh Solar Park (925 MW) in relation to the endangered Great Indian Bustard(GIB) issue. These majestic birds are on the brink of extinction, with less than 100 remaining in the natural habitat. Given their size, any collision with the power lines proves fatal for such birds, and the network of power lines stemming from solar plants have also formed a deadly web around the GIB habitat. As a result their population has significantly dwindled over the last few years. Furthermore, it has been learnt that on 19.04.2021, Hon'ble Supreme Court has passed an order in M. K. Ranjitsinh & Ors. V. Union of India & Ors., outlining direction and measures to be taken particularly regarding the conversion of over-head power transmission lines into underground power lines in the areas identified as Priority and Potential habitats for the Great Indian Bustard (GIB). In this regard, Hon'ble Supreme Court had also constituted a three member Committee comprising of wildlife experts and Scientists for the purpose of assessing the feasibility of laying underground power lines. Acknowledging the gravity of the issue, the Committee feel the need to strike a rightful balance between wildlife conservation, especially Great Indian Bustard and development of Green Energy initiatives. The Committee urge the Ministry to explore advanced technological methods like microwaves for wireless transmission of solar power from solar parks in such critical locations to protect these endangered species.

11. The Committee note that several Solar Projects are experiencing delays in finalization of their external power evacuation systems and transmission infrastructure primarily because these projects are located in forest areas. This situation has apparently caused delay in implementation of projects like Barethi Solar Park (630 MW) and Chhatarpur Solar Park (950 MW), which are situated within Panna Tiger reserve. The Committee feel that the Ministry Should collaborate with all relevant stakeholders viz. Ministry of Environment Forest and Climate Change, Central Electricity Authority (CEA), Central Transmission Unit (CTU)/State Transmission Unit (STU), Solar Power Park Developers (SSPDs) and other concerned Ministries/Departments of the Union and the States, to evolve a comprehensive action plan, to ensure hassle free and time bound external power evacuation systems and transmission infrastructure for solar parks, especially for those located in forest areas.

12. The Committee note that the floating Solar Parks are facing maintenance issues. The SECI and MNRE are reportedly deliberating highly automated solutions to address those. The Committee desire to be furnished the action taken on this issue.

NEW DELHI;
6 December, 2023
15 Agrahayana, 1945 (Saka)

DR. SANJAY JAISWAL
CHAIRPERSON
COMMITTEE ON ESTIMATES

STATE-WISE ESTIMATED SOLAR ENERGY POTENTIAL IN THE COUNTRY

Sl. No.	State/UT	Solar Potential (GWp) #
1.	Andhra Pradesh	38.44
2.	Arunachal Pradesh	8.65
3.	Assam	13.76
4.	Bihar	11.20
5.	Chhattisgarh	18.27
6.	Delhi	2.05
7.	Goa	0.88
8.	Gujarat	35.77
9.	Haryana	4.56
10.	Himachal Pradesh	33.84
11.	Jammu & Kashmir	111.05
12.	Jharkhand	18.18
13.	Karnataka	24.70
14.	Kerala	6.11
15.	Madhya Pradesh	61.66
16.	Maharashtra	64.32
17.	Manipur	10.63
18.	Meghalaya	5.86
19.	Mizoram	9.09
20.	Nagaland	7.29
21.	Odisha	25.78
22.	Punjab	2.81
23.	Rajasthan	142.31
24.	Sikkim	4.94
25.	Tamil Nadu	17.67
26.	Telangana	20.41
27.	Tripura	2.08
28.	Uttar Pradesh	22.83
29.	Uttarakhand	16.80
30.	West Bengal	6.26
31.	UTs	0.79
TOTAL		748.98

Assessed by National Institute of Solar Energy

Annexure-II

STATE/UT-WISE DATA FOR SOLAR INSOLATION

S.NO	State/UT	Lowest level of Insolation "KWh/m ² "	Highest level of Insolation "KWh/m ² "	Average Insolation "KWh/m ² "
1.	Andaman&Nicobar	4.182	5.391	4.671
2.	Andhra Pradesh	3.736	6.097	4.808
3.	Arunachal Pradesh	2.949	3.810	3.508
4.	Assam	3.964	4.718	4.259
5.	Bihar	3.696	5.196	4.606
6.	Chandigarh	3.433	4.650	4.410
7.	Chhattisgarh	4.072	5.370	4.629
8.	Goa	4.555	5.839	5.076
9.	Gujarat	3.927	5.942	4.874
10.	Haryana	3.282	4.733	4.439
11.	Himachal Pradesh	3.507	4.922	4.374
12.	Jammu & Kashmir	2.797	5.533	4.238
13.	Jharkhand	3.568	5.431	4.615
14.	Karnataka	4.191	6.181	4.938
15.	Kerala	3.665	6.241	5.232
16.	Ladakh	3.272	5.239	4.660
17.	Madhya Pradesh	3.357	5.692	4.834
18.	Maharashtra	2.068	6.255	4.894
19.	Manipur	4.008	4.820	4.341

20.	Meghalaya	3.803	4.308	4.087
21.	Mizoram	3.989	4.839	4.284
22.	Nagaland	3.823	4.115	3.989
23.	Odisha	3.092	5.377	4.691
24.	Pondicherry	4.429	5.737	4.847
25.	Punjab	3.014	5.219	4.275
26.	Rajasthan	4.104	6.184	4.975
27.	Sikkim	3.293	3.817	3.544
28.	Tamil Nadu	4.266	5.884	5.052
29.	Telangana	4.544	5.739	5.044
30.	Tripura	3.180	4.411	4.133
31.	Uttar Pradesh	3.175	5.426	4.492
32.	Uttarakhand	3.626	4.634	4.373
33.	West Bengal	3.519	4.591	4.149

Note-Data is not available for Delhi, Daman&Diu and Dadra&Nagar Haveli and Lakshadweep

SOLAR PARK-WISE CFA DISBURSED (in lakh)

S. No	Name of Park	Capacity approved (MW)	CFA disbursed
34.	Ananthapuramu-I Solar Park	1400	24480.5
35.	Kurnool Solar Park	1000	20025.0
36.	Kadapa Solar Park	1000	5425.0
37.	Ananthapuramu-II Solar Park	500	9124.8
38.	Solar Wind Hybrid Park	200	25.0
39.	Rajnandgaon Solar Park	100	0
40.	Radhnesada Solar Park	700	5615.0
41.	Pavagada Solar Park	2000	35194.5
42.	Kasaragod Solar Park	105	882.0
43.	Rewa Solar Park	750	13633.5
44.	Mandsaur Solar Park	250	2548.5
45.	Neemuch Solar Park	500	1560.5
46.	Agar Solar Park	550	1723.5
47.	Shajapur Solar Park	450	1800.0
48.	Sai Guru Solar Park	500	217.1
49.	Dondaicha Solar Park	250	625.0
50.	Vankal Solar Park	20	58.0
51.	Bhadla-II Solar Park	680	4489.7*
52.	Bhadla-III Solar Park	1000	11069.8*
53.	Bhadla-IV Solar Park	500	6025.0*

54.	Phalodi-Pokaran Solar Park	750	1825.0*
55.	Fatehgarh Phase-1B Solar Par	421	25.0
56.	Nokh Solar Park	925	6685.0
57.	Solar Park in UP	365	3801.0
58.	Jalaun Solar Park	1200	25.0
59.	Mirzapur Solar Park	100	10.0
60.	Lalitpur Solar Park	600	25.0
61.	Jhansi Solar Park	600	25.0

Note: There are some solar parks for which no CFA has been released.

** Other than this, CFA of ₹ 11440.0 Lakhs released to RVPN for development of External Transmission System for Bhadla II (680 MW), Bhadla III (500 MW) & Bhadla IV (250 MW) Solar Parks.*

CFA of ₹12000.0 Lakhs released to PGCIL for development of External Transmission System for Bhadla III (500 MW), Bhadla IV (250 MW) and PhalodiPokaran Solar Park (750 MW)”

YEAR-WISE EXPENDITURE INCURRED ON THE SCHEME

Sl. No.	Financial Year	Expenditure incurred (₹ in Crore)
1.	2014-15	155.88
2.	2015-16	368.13
3.	2016-17	117.48
4.	2017-18	430.51
5.	2018-19	267.13
6.	2019-20	227.54
7.	2020-21	68.18
8.	2021-22	207.33
9.	2022-23	676.10
10.	2023-24	149.84
Total		2518.29

MODE-WISE APPROVAL OF SOLAR PARKS

Sl. No.	Solar Park	Mode 1	Mode 2	Mode 4	Mode 5	Mode 8	Capacity
1	Ananthapuramu-I Solar Park	-	1400	-	-	-	1400
2	Kurnool Solar Park	-	1000	-	-	-	1000
3	Kadapa Solar Park	-	1000	-	-	-	1000
4	Ananthapuramu-II Solar Park	-	500	-	-	-	500
5	Solar Wind Hybrid Park	-	-	-	200	-	200
6	Rajnandgaon Solar Park	-	-	-	-	100	100
7	Radhnesada Solar Park	700	-	-	-	-	700
8	Dholera Solar Park Ph-I	1000	-	-	-	-	1000
9	NTPC RE Park	-	-	-	-	4750	4750
10	GSECL RE Park	-	-	-	-	3325	3325
11	GIPCL RE Park Ph-I	-	-	-	-	600	600
12	GIPCL RE Park Ph-II	-	-	-	-	1200	1200
13	GIPCL RE Park Ph-III	-	-	-	-	450	450
14	Kaza Solar Park	-	-	-	-	880	880
15	Kinnaur Solar Park	-	-	-	-	400	400
16	Floating Solar Park	-	-	-	100	-	100
17	Deogarh Solar Park	20	-	-	-	-	20
18	Palamu Solar Park	20	-	-	-	-	20
19	Garwha Solar Park	20	-	-	-	-	20
20	Simdega Solar Park	20	-	-	-	-	20
21	DVC Floating Park Ph-I	-	-	-	-	755	755
22	DVC Floating Park Ph-II	-	-	-	-	234	234
23	Pavagada Solar Park	-	2000	-	-	-	2000
24	Kalaburji Solar Park	-	-	-	-	500	500
25	Kasaragod Solar Park	-	105	-	-	-	105
26	Floating Solar Park	-	-	-	-	50	50
27	Rewa Solar Park	-	750	-	-	-	750
28	Mandsaur Solar Park	-	250	-	-	-	250
29	Neemuch Solar Park	-	-	-	-	500	500
30	Agar Solar Park	-	-	-	-	550	550
31	Shajapur Solar Park	-	-	-	-	450	450
32	Omkareswar Floating Park	-	-	-	-	600	600
33	Chhattarpur Solar Park	-	-	-	-	950	950
34	Morena Solar Park	-	-	-	-	1400	1400
35	Barethi Solar Park	-	-	-	-	630	630

36	Sai Guru Solar Park	-	-	500	-	-	500
37	Dondaicha Solar Park	250	-	-	-	-	250
38	Vankal Solar Park	20	-	-	-	-	20
39	Solar Park in Odisha	-	-	-	40	-	40
40	Floating Solar Park Ph-I	-	-	-	-	100	100
41	Floating Solar Park Ph-II	-	-	-	-	200	200
42	Bhadla-II Solar Park	680	-	-	-	-	680
43	Bhadla-III Solar Park	-	-	1000	-	-	1000
44	Bhadla-IV Solar Park	-	-	500	-	-	500
45	Phalodi-Pokaran Solar Park	-	-	750	-	-	750
46	Fatehgarh Ph-1B Solar Park	-	-	421	-	-	421
47	Nokh Solar Park	925	-	-	-	-	925
48	Pugal Solar Park	-	-	-	-	1450	1450
49	RVUN Solar Park	-	-	-	-	1310	1310
50	Solar Park in UP	-	365	-	-	-	365
51	Jalaun Solar Park	-	-	-	-	1200	1200
52	Mirzapur Solar Park	-	-	-	100	-	100
53	Kalpi Solar Park	-	-	-	65	-	65
54	Lalitpur Solar Park	-	-	-	-	600	600
55	Jhansi Solar Park	-	-	-	-	600	600
56	Chitrakoot Solar Park	-	-	-	-	800	800
Total		3655	7370	3171	505	24584	39285

Note: No parks are sanctioned under Mode-3, 6 & 7

Annexure-VI

DETAILS OF SOLAR PROJECTS DEVELOPERS (SPDS) INSIDE SOLAR PARKS (AS ON 30-09-2023)

Sl. No.	Name of the Solar Park	Name of SPD	Capacity (MW)
1	Ananthapuramu Solar Park (1400 MW)	NTPC	250
		SB Energy Solar Private Limited	250
		Sprng Agnitra Pvt. Ltd.	250
		Ayana Ananthapuramu Solar Private Limited	250
		Tata Power Renewable Energy Limited	100
		Azure Power Thirty-Six Pvt Ltd	50
		Athena Karnal Solar Power Pvt Ltd	150
		IndiGrid Solar-I (AP) Private Limited	100
Sub-Total			1400
2	Kurnool Solar Park (1000 MW)	Aarish Solar Power Pvt. Ltd.	50
		Aashman Energy Pvt. Ltd.	50
		Divyesh Power Pvt. Ltd.	50
		Elena Renewable Energy Pvt. Ltd.	50
		Pratyash Renewable Pvt. Ltd.	100
		SEI Baskara Power Pvt. Ltd.	50
		SEI EnerStar Renewable Energy Pvt. Ltd.	50
		SEI Mihir Energy Pvt. Ltd.	50
		Shreyas Renewable Energy Pvt. Ltd.	50
		Zuvan Energy Pvt. Ltd.	50
		SBG Cleantech Two Ltd.	350
		Azure Power India Pvt Ltd	100
Sub-Total			1000
3	Ananthapuramu-II Solar Park (500 MW)	Andhra Pradesh Power Generation Corporation Limited	400
		Yet to be identified	100
		Sub-Total	
4	Kadapa Solar Park (1000 MW)	Solairedirect Energy India Private Limited	250
		SB Energy Seven Private Limited	250
		Sprng Soura Kiran Vidyut Pvt. Ltd.	250
		Ayana Kadapa Renewable Power Private Limited	250
Sub-Total			1000
5	Ramaguri Solar Park (300 MW)	SECI (EPC Mode)	300

Sl. No.	Name of the Solar Park	Name of SPD	Capacity (MW)
6	Rajnandgaon Solar Park (100 MW)	Tata Power Renewable Energy Limited	100
7	Radhanesda Solar Park (700 MW)	Engie	200
		Tata Power Renewable Energy Limited	100
		Gujarat Industries Power Company Ltd	100
		Gujarat State Electricity Corporation Limited	200
		SJVN GEL	100
Sub-Total			700
8	Dholera Solar Park (1000 MW)	Tata Power Renewable Energy Limited	400
		Vena Energy	100
		ReNew	200
		SJVN	100
		TEQ	200
Sub-Total			1000
9	NTPC RE Park (4750 MW)	NTPC (EPC Mode)	2455
		NTPC (Yet to be finalized)	2295
Sub-Total			4750
10	GSECL RE Park (3325 MW)	NHPC	200
		SJVN GEL	200
		RNTPC REL	200
		GIPCL	600
		Yet to be identified	2125
Sub-Total			3325
11	GIPCL Ph-I RE Park (600 MW)	Yet to be identified	600
12	GIPCL Ph-II RE Park (1200 MW)	Yet to be identified	1200
13	GIPCL Ph-III RE Park (575 MW)	Yet to be identified	575
14	Floating Solar Park by SECI (100 MW)	Yet to be identified	100
15	DVC Ph-I Floating Solar Park (755 MW)	Yet to be identified	755
16	DVC Ph-II Floating Solar Park (234 MW)	Yet to be identified	234
17	Pavagada Solar Park (2000 MW)	Yarrow Infrastructure Limited	50
		Fortum FinnSurya Energy Private Limited	100
		Tata Power Renewable Energy Ltd,	400

Sl. No.	Name of the Solar Park	Name of SPD	Capacity (MW)
		Parampujya Solar Energy Private Limited,	150
		ACME Solar Holdings Pvt Ltd	100
		Renew Solar Power Pvt Ltd	350
		SBE Five Ltd	200
		Azure Power India Pvt Ltd.	100
		Giriraj Renewables Pvt Ltd	300
		Fortum Solar India Private Ltd	250
Sub-Total			2000
18	Bidar Solar Park (500 MW)	Yet to be identified	500
19	Kasaragod Solar Park (105 MW)	IREDA (EPC Mode)	50
		THDCIL (EPC Mode)	50
		MIMS	5
Sub-Total			105
20	NHPC Floating Solar Park (50 MW)	Yet to be identified	50
21	Mandsaur Solar Park (250 MW)	NTPC (EPC Mode)	250
22	Rewa Solar Park (750 MW)	Mahindra Renewables Private Limited	250
		Acme Solar Ltd	250
		Arinsun clean Energy Ltd	250
Sub-Total			750
23	Neemuch Solar Park (500 MW)	TP Saurya	330
		Aljomath Energy & Water	170
Sub-Total			500
24	Agar Solar Park (550 MW)	Avaada Energy	200
		Beempow Energy	350
Sub-Total			550
25	Shajapur Solar Park (450 MW)	NTPC REL	325
		Taletuttayi Solar Project Nine	125
Sub-Total			450
26	Chhatarpur Solar Park (450 MW)	Yet to be identified	450
27	Omkareshwar Floating Solar Park (600 MW)	NHDC	88
		Amp Energy	100
		SJVN Ltd	90
		Yet to be identified	322
Sub-Total			600
28	Barethi Solar Park	Yet to be identified	630

Sl. No.	Name of the Solar Park	Name of SPD	Capacity (MW)
	(630 MW)		
29	Sai Guru Solar Park (500 MW)	Matter under Arbitration	500
30	Dondaicha Solar Park (250 MW)	TP Saurya	250
31	Vankal Solar Park (20 MW)	Sukhbir Agro Energy Ltd.	15
		ATA Renewables Pvt. Ltd.	5
		Sub-Total	20
32	Solar Park NHPC (40 MW)	Yet to be identified	40
33	Floating Solar Park Ph-I (200 MW)	Yet to be identified	200
34	Floating Solar Park Ph-II (100 MW)	Yet to be identified	100
35	Bhadla Ph II Solar Park (680 MW)	NTPC (EPC MODE)	260
		Rising Sun Energy Pvt. Ltd.	140
		Yarrow Infrastructure limited	70
		Solaire Surya Urja Private Limited	140
		Fortum Finn Surya Energy Private limited	70
		Sub-Total	680
36	Bhadla-III Solar Park (1000 MW)	Acme Solar Holding Pvt Ltd.	200
		SBG Cleantech One Ltd	300
		Hero Solar Energy Pvt Ltd	300
		SBE Four Ltd	200
		Sub-Total	1000
37	Bhadla IV Solar Park (500 MW)	Phelan Energy India RJ Pvt Ltd	50
		Clean Sustainable Energy Pvt Ltd	100
		SB Energy 3 Pvt Ltd	100
		Azure Power India Pvt Ltd	200
		Renew Solar Power Pvt Ltd	50
		Sub-Total	500
38	Phalodi Pokaran Solar Park (750 MW)	Adani Solar Energy RJ ONE Solar Pvt. Ltd.	600
		Yet to be identified	150
		Sub-Total	750
39	Fatehgarh Ph IB Solar Park (421 MW)	NTPC Ltd.	296
		Adani Hybrid Energy Jaisalmer Four Limited	125
		Sub-Total	421
40	Nokh Solar Park	Rising Sun	190

Sl. No.	Name of the Solar Park	Name of SPD	Capacity (MW)
	(925 MW)	NTPC REL (EPC Mode)	735
		Sub-Total	925
41	Pugal Solar Park Ph-I (1000 MW)	Yet to be identified	1000
42	Pugal Solar Park Ph-II (1000 MW)	Yet to be identified	1000
43	RRVUL Solar Park (2000 MW)	NLC India	810
		Coal India (EPC Mode)	1190
		Sub-Total	2000
44	Kalpi Solar Park (65 MW)	NHPC (EPC Mode)	65
45	UP Solar Park (365 MW)	Rattan India2 Solar Pvt Ltd	50
		Enviro Solar Pvt Ltd	75
		Azure Venus Pvt Ltd	40
		SJVN Ltd	200
		Sub-Total	365
46	Jalaun Solar Park (1200 MW)	Yet to be identified	1200
47	Mirzapur Solar Park (100 MW)	Yet to be identified	100
48	Jhansi Solar Park (600 MW)	Yet to be identified	600
49	Lalitpur Solar Park (600 MW)	Yet to be identified	600
50	Chitrakoot Solar Park (800 MW)	Yet to be identified	800
Total			37490

Annexure-VII

LIST OF APPROVED SOLAR PARKS

Sl. No.	State	Name of Park	Name of the SPPD	Capacity approved (MW)	Projects installed so far (MW)
1.	Andhra Pradesh (5 Parks, 4200 MW)	Ananthapuramu-I Solar Park	AP Solar Power Corporation Pvt. Ltd. (APSPCL); A JVC of SECI, APGENCO and NREDCAP	1400	1400
2.		Kurnool Solar Park		1000	1000
3.		Kadapa Solar Park		1000	250
4.		Ananthapuramu-II Solar Park		500	400
5.		Ramagiri Solar Park	Solar Energy Corporation of India (SECI) Ltd.	300	0
6.	Chhattisgarh (1 Park, 100 MW)	Rajnandgaon Solar Park	SECI Ltd.	100	0
7.	Gujarat (7 Parks, 12150 MW)	Radhnesada Solar Park	Gujarat Power Corporation Limited (GPCL)	700	500
8.		Dholera Solar Park		1000	300
9.		NTPC RE Park	NTPC Renewable Energy Ltd.	4750	0
10.		GSECL RE Park	Gujarat State Electricity Corporation Ltd. (GSECL)	3325	0
11.		GIPCL RE Park Ph-I	Gujarat Industries Power Company Ltd (GIPCL)	600	0
12.		GIPCL RE Park Ph-II		1200	0
13.		GIPCL RE Park Ph-III		575	0
14.	Jharkhand (3 Parks, 1089 MW)	SECI Floating Solar Park	SECI Ltd.	100	0
15.		DVC Floating Solar Park Ph-I	Damodar Valley Corporation (DVC)	755	0
16.		DVC Floating Solar Park Ph-II		234	0
17.	Karnataka (2 Parks, 2500 MW)	Pavagada Solar Park	Karnataka Solar Power Development Corporation Pvt. Ltd. (KSPDCL); JVC of KREDL & SECI	2000	2000
18.		Kalburgi Solar Park	Karnataka Renewable Energy Development Ltd	500	0

Sl. No.	State	Name of Park	Name of the SPPD	Capacity approved (MW)	Projects installed so far (MW)
			(KREDL)		
19.	Kerala (2 Parks, 155 MW)	Kasargod Solar Park	Renewable Power Corporation of Kerala Limited (RPCKL); A JVC of SECI & KSEB	105	100
20.		Floating Solar Park	NHPC Limited	50	0
21.	Madhya Pradesh (8 Parks, 4680 MW)	Rewa Solar Park	Rewa Ultra Mega Solar Limited (RUMSL); A JVC of Madhya Pradesh Urja Vikas Nigam Limited (MPUVN) & SECI	750	750
22.		Mandsaur Solar Park		250	250
23.		Neemuch Solar Park		500	0
24.		Agar Solar Park		550	0
25.		Shajapur Solar Park		450	0
26.		Omkareswar Floating Solar Park		600	0
27.		Chhatarpur Solar Park		950	0
28.		Barethi Solar Park		NTPC Renewable Energy Ltd	630
29.	Maharashtra(2 Parks, 750 MW)	Sai Guru Solar Park	M/s Sai Guru Mega Solar Park Pvt. Ltd.	500	0
30.		Dondaicha Solar Park	Maharashtra State Electricity Generating Company Ltd. (MAHAGENCO)	250	0
31.	Mizoram (1 Park, 20 MW)	Vankal Solar Park	Power & Electricity Department	20	20
32.	Odisha (3 Parks, 340 MW)	Solar Park by NHPC	NHPC Limited	40	0
33.		Floating Solar Park Ph-I	NHPC Limited & GEDCOL	100	0
34.		Floating Solar Park Ph-II	NHPC Limited & GEDCOL	200	0
35.	Rajasthan (9 Parks, 8276 MW)	Bhadla-II Solar Park	Rajasthan Solar Park Development Company Ltd. (RSDCL); subsidiary of RRECL	680	680
36.		Bhadla-III Solar Park	M/s Surya Urja Company of Rajasthan Ltd (SUCRL); A JVC of State Govt. & IL&FS Energy	1000	1000

Sl. No.	State	Name of Park	Name of the SPPD	Capacity approved (MW)	Projects installed so far (MW)	
37.		Bhadla-IV Solar Park	M/s Adani Renewable Energy Park Rajasthan Limited (AREPRL); A JVC of State Govt. & Adani Renewable Energy Park Ltd.	500	500	
38.		Phalodi-Pokaran Solar Park	M/s Essel Surya Urja Company of Rajasthan Limited (ESUCRL); A JVC of State Govt. & Essel Infraprojects Ltd	750	300	
39.		Fatehgarh Phase-1B Solar Park	AREPRL	421	421	
40.		Nokh Solar Park	RSDCL	925	0	
41.		Pugal Solar Park Ph-I		1000	0	
42.		Pugal Solar Park Ph-II		1000	0	
43.		RVUN Solar Park	Rajasthan Rajya Vidyut Utpadan Nigam Ltd (RRVUNL)	2000	0	
44.		Uttar Pradesh (7 Park, 3730 MW)	Solar Park in UP	Lucknow Solar Power Development Corporation Ltd. (LSPDCL); A JVC of UPNEDA & SECI	365	240
45.			Jalaun Solar Park	Bundelkhand Saur Urja Limited (BSUL); A JVC of NHPC & UPNEDA	1200	0
46.			Mirzapur Solar Park		100	0
47.	Kalpi Solar Park		65		26	
48.	Lalitpur Solar Park		TUSCO Ltd; A JVC of THDC & UPNEDA	600	0	
49.	Jhansi Solar Park			600	0	
50.	Chitrakoot Solar Park			800	0	
Total				37990	10137	

“LIST OF SOLAR PARKS WITH DATE OF IN-PRINCIPLE APPROVAL WHERE SOLAR PROJECTS ARE NOT COMMISSIONED EITHER FULLY OR PARTIALLY

Sl. No.	Solar Park	Date of in-principle approval	Capacity (MW)
1.	Ramagiri Solar Park	11-Nov-2021	300
2.	Rajnandgaon Solar Park	31-Mar-2022	100
3.	NTPC RE Park	12-Jul-2021	4750
4.	GSECL RE Park	12-Aug-2021	3325
5.	GIPCL RE Park Ph-I	24-Sep-2021	600
6.	GIPCL RE Park Ph-II	24-Feb-2022	1200
7.	GIPCL RE Park Ph-III	31-Mar-2022	575
8.	SECI Floating Solar Park	4-Apr-2019	100
9.	DVC Floating Solar Park Ph-I	24-Feb-2022	755
10.	DVC Floating Solar Park Ph-II	31-Mar-2022	234
11.	Kalburgi Solar Park	26-Apr-2021	500
12.	Floating Solar Park	8-Dec-2020	50
13.	Neemuch Solar Park	28-Jan-2020	500
14.	Agar Solar Park	29-Jan-2020	550
15.	Shajapur Solar Park	30-Jan-2020	450
16.	Omkareswar Floating Solar Park	17-Sep-2020	600
17.	Chhattarpur Solar Park	17-Sep-2020	950
18.	Barethi Solar Park	17-Sep-2020	630
19.	Sai Guru Solar Park	29-Sep-2015	500
20.	Dondaicha Solar Park	17-Dec-2015	250
21.	Solar Park in Odisha	19-Mar-2020	40
22.	Floating Solar Park Ph-I	8-Dec-2020	100
23.	Floating Solar Park Ph-II	24-Feb-2022	200
24.	Nokh Solar Park	18-Jul-2017	925
25.	Pugal Solar Park Ph-I	24-Feb-2022	1000
26.	Pugal Solar Park Ph-II	31-Mar-2022	1000
27.	RVUN Solar Park	31-Mar-2022	2000
28.	Jalaun Solar Park	17-Sep-2020	1200
29.	Mirzapur Solar Park	2-Mar-2021	100
30.	Lalitpur Solar Park	13-Oct-2020	600
31.	Jhansi Solar Park	13-Oct-2020	600
32.	Chitrakoot Solar Park	18-Aug-2021	800

LIST OF SOLAR PARKS AFFECTED WITH LAND ISSUES

Sl. No.	Solar Park	Capacity (MW)
1.	Kadapa Solar Park	1000
2.	Solar Wind Hybrid Park	200
3.	Kaza Solar Park	880
4.	Kinnaur Solar Park	400
5.	Deogarh Solar Park	20
6.	Palamu Solar Park	20
7.	Garwha Solar Park	20
8.	Simdega Solar Park	20
9.	Kalaburagi Solar Park	500
10.	Dondaicha Solar Park	250
11.	Phalodi-Pokaran Solar Park	750
12.	Fatehgarh Phase-1B Solar Park	421
13.	Pugal Solar Park	1450
14.	Solar Park in UP	365
15.	Jalaun Solar Park	1200
16.	Mirzapur Solar Park	100
17.	Lalitpur Solar Park	600
18.	Jhansi Solar Park	600
19.	Chitrakoot Solar Park	800
	TOTAL	9596

Annexure-X

The Park-wise major issues and interventions made by this Ministry

Sl. No.	Solar Park	Challenges/Issues	Ministry's intervention
1.	Kadapa Solar Park, Andhra Pradesh (1000 MW)	<p>250 MW solar projects already commissioned. For the balance 750 MW, tariff discovered in the competitive bidding was adopted by APERC subject to certain amendments to PSA.</p> <p>The developers have challenged the conditional approval of PSA by APERC in APTEL. APTEL has issued final orders on 27.02.2020 in favour of developers. The order of APTEL is yet to be adopted by the State Govt.</p>	Ministry through various communications to the highest level and review meetings has tried to resolve the issue. The matter is yet to be resolved.
2.	Ananthapuramu-II Solar Park, Andhra Pradesh (500 MW)	Solar Park is developed and 400 MW solar project is also commissioned. For the balance 100 MW capacity, tender is to be issued by the State/SPPD.	State Govt. has been requested several times to finalize bidders for this 100 MW capacity.
3.	Dholera Solar Park, Gujarat (1000 MW)	300 MW solar projects already commissioned. For the balance 700 MW capacity, discovered tariff has not been accepted by State Regulator. GUVNL has re-tendered this capacity. However, the developers of initial tender moved to APTEL for stay of retender and APTEL's final order is pending.	State Govt. has been requested to resolve the issue in multiple review meetings.
4.	SECI Floating Solar Park, Jharkhand (100 MW)	Delay in approval of Solar Park cost and charges by the State Govt.	State Govt has been requested to form such Committee for the same
5.	NHPC Floating Solar Park, Kerala (50 MW)	Initial tariff discovered in the bidding was not accepted by the State DISCOMs. Tender reissued by the SPPD, which is yet to be finalized.	State Govt./SPPD have been requested to expedite the tender process and accept the discovered tariff.
6.	Neemuch Solar Park, Madhya Pradesh (500 MW)	Mismatch in the readiness of the park infrastructure and external power evacuation system	Ministry through various review meetings taken up the issue with CEA, CTU, PGCIL

Sl. No.	Solar Park	Challenges/Issues	Ministry's intervention
7.	Agar Solar Park, Madhya Pradesh (550 MW)		and SPPDs to minimize the time mismatch.
8.	Shajapur Solar Park, Madhya Pradesh (450 MW)		
9.	Omkareswar Floating Solar Park, Madhya Pradesh (600 MW)	Initial tariff discovered in the bidding was not accepted by the State. Tender reissued by the SPPD, which is yet to be finalized.	State Govt./SPPD have been requested to expedite the tender process and accept the discovered tariff.
10.	Chhatarpur Solar Park, Madhya Pradesh (950 MW)	Delay in finalization of external power evacuation system due to forest area.	The matter was taken up in a review meeting by the Ministry with CEA & CTU. The earlier planned common transmission system for Barethi Solar Park (630 MW) and Chhatarpur Solar Park (950 MW) was falling under Panna tiger reserve. Subsequently, separate substations were planned for both the parks and the forest related issue was resolved.
11.	Barethi Solar Park, Madhya Pradesh (630 MW)		
12.	Floating Solar Park Ph-I, Odisha (100 MW)	Initial tariff discovered in the bidding was not accepted by the State DISCOMs. Tender reissued by the SPPD, which is yet to be finalized.	State Govt./SPPD have been requested to expedite the tender process and accept the discovered tariff.
13.	Floating Solar Park Ph-II Odisha (200 MW)		
14.	Phalodi-Pokaran Solar Park, Rajasthan (750 MW)	The Solar Park faced challenges like GIB issue and court case w.r.t. land allotment.	The matters were taken up in various review meetings. Both the issues are now resolved.
15.	Nokh Solar Park, Rajasthan (925 MW)	The Solar Park faced challenges like GIB issue and RoW issue.	The matters were taken up in various review meetings. Both the issues are now resolved.
16.	Pugal Solar Park Ph-I, Rajasthan (1000 MW)	Allotment of land is pending with the State Govt.	In various review meetings, the State Govt has been requested to expedite

Sl. No.	Solar Park	Challenges/Issues	Ministry's intervention
17.	Pugal Solar Park Ph-II, Rajasthan (1000 MW)		allotment of land. Land allotment is under process.
18.	Jalaun Solar Park, Uttar Pradesh (1200 MW)	Allotment of Govt. land is pending with the State Govt.	The matter has been taken up in various review meetings and the State Govt. has been requested to expedite allotment of land. The land rule for allotment is finalized by the UP Govt. The land will be handed over shortly.
19.	Mirzapur Solar Park, Uttar Pradesh (100 MW)		
20.	Kalpi Solar Park, Uttar Pradesh (65 MW)	26 MW solar project already commissioned. The balance capacity is stalled as the EPC contractor is unable to procure modules for remaining capacity due to levy of BCD.	The matter is taken up with the Ministry of Finance.
21.	Lalitpur Solar Park, Uttar Pradesh (600 MW)	Allotment of Govt. land is pending with the State Govt.	The matter has been taken up in various review meetings and the State Govt has been requested to expedite allotment of land. The land rule for allotment is finalized by the UP Govt. The land will be handed over shortly.
22.	Jhansi Solar Park, Uttar Pradesh (600 MW)		
23.	Chitrakoot Solar Park, Uttar Pradesh (800 MW)		

MINUTES OF TENTH SITTING OF THE COMMITTEE ON ESTIMATES (2022-2023)

The Committee sat on Wednesday, the 14th September, 2022 from 1122 hrs. to 1220 hrs. in Committee Room 'D', Parliament House Annexe, New Delhi.

PRESENT

Shri Girish Bhalchandra Bapat – Chairperson

Members

2. Kunwar Danish Ali
3. Shri Sudarshan Bhagat
4. Shri Kesineni Srinivas(Nani)
5. Shri Francisco Cosme Sardinha
6. Col. Rajyavardhan Singh Rathore
7. Shri Nihal Chand Chauhan
8. Shri Rajiv Pratap Rudy
9. Dr. K.C. Patel
10. Shri. Pinaki Mishra

SECRETARIAT

1. Shri. Muraleedharan. P - Director
2. Smt. Geeta Parmar - Additional Director

REPRESENTATIVES OF THE MINISTRY NEW AND RENEWABLE ENERGY

1. Shri Indu Shekhar Chaturvedi - Secretary
2. Shri Dilip Nigam - Advisor
3. Smt Suman Sharma - MD, SECI
4. Shri VimalendraAnnand Patwardhan - JS & FA

2. At the outset, the Chairperson welcomed the Secretary and other officials of Ministry of New and Renewable Energy to the sitting of the Committee convened to have a briefing by the Ministry on the subject 'Implementation of Development of Solar Parks and Ultra Mega Solar Power Projects - A review' Their attention was also drawn to Direction 55(1) of 'Directions by the Speaker, Lok Sabha' about the confidentiality of the proceedings of the Committee.

4. Thereafter, the Secretary, Ministry of New and Renewable Energy made a power point presentation highlighting the Overview of the RE Sector, concept and schematic representation of Solar Parks, various modes of development of Solar parks, working of Solar parks, Milestones for development of CFA, timelines for development of Solar parks, list of approved parks, the present status and expenditure on Solar park development etc

5. The Chairperson and Members of the Committee raised several queries on the issues relating to less number of Solar parks commissioned so far if compared to the target, feasibility of the policy for allowing one State investing for Solar Park development in other States, involving State/Central PSUs in Solar park development, study of Quality of Solar radiation in various States, feasibility of utilizing the vast lands of Ministries of Defence , Railways for Solar Park development, feasibility of development of floating Solar parks along India's vast coastlines, impact on temperature, research in tidal power, vertical solar panels along cultivable land etc.

6. The representatives of the Ministry responded to the queries raised by the Members. The Chairperson thanked the representatives of the Ministry and asked them to furnish written replies, on the points, for which information was not readily available, within two weeks.

7. The witness, then, withdrew.

8. A verbatim record of the proceedings has been kept.

The Committee then adjourned.

MINUTES OF THE SEVENTH SITTING OF THE COMMITTEE ON ESTIMATES (2023-2024)

The Committee sat on Wednesday, the 6th December, 2023 from 1500 hrs. to 1545 hrs. in Main Committee Room Ground Floor, Parliament House Annexe, New Delhi.

PRESENT

Dr. Sanjay Jaiswal – Chairperson

Members

1. Kunwar Danish Ali
2. Shri Sudarshan Bhagat
3. Shri P. P. Chaudhary
4. Shri Nihal Chand Chauhan
5. Shri Saikia Dilip
6. Shri Parvatagouda Chandanagouda Gaddigoudar
7. Shri Dharmendra Kumar Kashyap
8. Shri K. Muraleedharan
9. Shri S. S. Palanimanickam
10. Shri Ashok Kumar Rawat
11. Shri Magunta Sreenivasulu Reddy
12. Shri Jugal Kishore Sharma
13. Shri Prathap Simha

SECRETARIAT

1. Shri Santosh Kumar - Joint Secretary
 2. Shri Muraleedharan. P - Director
 3. Smt. Anju Kukreja - Deputy Secretary
2. At the outset, the Chairperson welcomed the Members to the sitting of the Committee. The Committee then took up for consideration and adoption of the draft

Report on the subject 'Implementation of Development of Solar Parks and Ultra Mega Solar Power Projects - A review'.

3. The Committee after due deliberations adopted the draft Report. The Committee then, authorised the Chairperson to finalize the draft Report on the basis of factual verification received from the concerned Ministry and present the same to Lok Sabha.

4. xxx xxx xxx xxx

The Committee, then, adjourned.