

NON- UTILISATION OF SOLAR THERMAL POWER PLANT

[Action Taken by the Government on the Observations/Recommendations of the
Committee contained in their Sixty - First Report (17th Lok Sabha)]

MINISTRY OF NEW AND RENEWABLE ENERGY

PUBLIC ACCOUNTS COMMITTEE
(2023-24)

ONE HUNDRED AND TWELFTH REPORT

SEVENTEENTH LOK SABHA



LOK SABHA SECRETARIAT
NEW DELHI

PAC NO. 2342

**ONE HUNDRED AND TWELFTH
REPORT**

**PUBLIC ACCOUNTS COMMITTEE
(2023-24)**

(SEVENTEENTH LOK SABHA)

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MINISTRY OF NEW AND RENEWABLE ENERGY



Presented to Lok Sabha on: 08.02.2024

Laid in Rajya Sabha on: 08.02.2024

**LOK SABHA SECRETARIAT
NEW DELHI**

February, 2024 /Magha, 1945 (Saka)

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* not appended to cyclostyled copy of the report

COMPOSITION OF THE PUBLIC ACCOUNTS COMMITTEE
(2023-24)

Shri Adhir Ranjan Chowdhury - Chairperson

MEMBERS

LOK SABHA

2. Shri Thalikkottai Rajuthevar Baalu
3. Shri Subhash Chandra Baheria
4. Shri Bhartruhari Mahtab
5. Shri Jagdambika Pal
6. Shri Vishnu Dayal Ram
7. Shri Pratap Chandra Sarangi
8. Shri Rahul Ramesh Shewale
9. Shri Gowdar Mallikarjunappa Siddeshwara
10. Shri Brijendra Singh
11. Shri Rajiv Ranjan Singh *alias* Lalan Singh
12. Dr. Satya Pal Singh
13. Shri Jayant Sinha
14. Shri Balashowry Vallabbhaneni
15. Shri Ram Kripal Yadav

RAJYA SABHA

16. Shri Shaktisinh Gohli
17. Dr. K. Laxman
18. Shri Derek O' Brien
19. Shri Tiruchi Siva
20. Dr. M. Thambidurai
21. Shri Ghanshyam Tiwari
22. Dr. Sudhanshu Trivedi

Secretariat

- | | | |
|-------------------------------|---|-----------------------------|
| 1. Shri Sanjeev Sharma | - | Joint Secretary |
| 2. Smt. Bharti Sanjeev Tuteja | - | Director |
| 3. Shri Girdhari Lal | - | Deputy Secretary |
| 4. Shri Ashikho Alema | - | Committee Officer |
| 5. Ms. Khyati | - | Assistant Committee Officer |

* Elected w.e.f. 19.08.2023 consequent upon retirement of Shri Sukhendu Sekhar Ray, MP on 18.08.2023.

INTRODUCTION

I, the Chairperson, Public Accounts Committee (2023-24) having been authorised by the Committee, do present this One Hundred and Twelfth Report (Seventeenth Lok Sabha) on Action Taken by the Government on the Observations/Recommendations of the Public Accounts Committee contained in their Sixty-first Report on 'Non-utilisation of Solar Thermal Power Plant' relating to Ministry of New and Renewable Energy.

2. The Sixty-first Report was presented to Lok Sabha/laid in Rajya Sabha on 5th April, 2023. Replies of the Government to all the Observations/Recommendations contained in the Report were received. The Public Accounts Committee considered and adopted the One Hundred and Twelfth Report at their sitting held on 05th February 2024. Minutes of the Sitting are given at Appendix I.

3. For facility of reference and convenience, the Observations and Recommendations of the Committee have been printed in **bold** in the body of the Report.

4. The Committee also place in record their appreciation of the assistance rendered to them in the matter by the Committee Secretariat and the Office of the Comptroller and Auditor General of India.

5. An analysis of the action taken by the Government on the Observations/Recommendations contained in the Sixty-first Report (Seventeenth Lok Sabha) is given at Appendix-II.

NEW DELHI;
07 February, 2024
18 Magha, 1945 (Saka)

ADHIR RANJAN CHOWDHURY
Chairperson,
Public Accounts Committee

CHAPTER - I

REPORT

This Report of the Public Accounts Committee deals with the Action Taken by the Government on the Observations and Recommendations of the Committee contained in their Sixty-first Report (17th Lok Sabha) on "Non-utilisation of Solar Thermal Power Plant" relating to the Ministry of New & Renewable Energy.

2. The Sixty-first Report (Seventeenth Lok Sabha) was presented to Lok Sabha/laid in Rajya Sabha on 05 April 2023. It contained nine Observations/Recommendations. Action Taken Notes have been received from the Ministry of New & Renewable Energy and are categorized as under:

- (ii) Observations/Recommendations which have been accepted by the Government:

Para Nos. 3, 4, 5, 6, 7, 8, 9,10, 11

Total: 09
Chapter - II

- (iii) Observations/Recommendations which the Committee do not desire to pursue in view of the replies received from the Government:

Para Nos. -

Total: NIL
Chapter - III

- (iv) Observations/Recommendations in respect of which replies of the Government have not been accepted by the Committee and which require reiteration:

Para Nos. -

Total: NIL
Chapter - IV

- (v) Observations/Recommendations in respect of which Government have furnished interim replies/no replies:

Para Nos.

Total: NIL
Chapter -V

3. The detailed examination of the subject by the Committee revealed non-utilisation of Solar Thermal Power Plant sanctioned by the Ministry of New and Renewable Energy (MNRE) under a Research and Development (R&D) project, 'Development of a Megawatt-scale Solar Thermal Power Testing, Simulation and Research Facility' for implementation by Indian Institute of Technology, Bombay. The project, expected to facilitate development of 1 MWh grid interactive solar thermal power plant had generated 9 MWh of electricity upto 31 August 2015. While an amount of Rs. 46.72 crore was released by MNRE for the project, the plant stopped functioning from September, 2015 and remained nonfunctional without any further action taken on the project. Upon scrutiny certain shortcomings were revealed from the audit observations and the Committee had accordingly given their observations/recommendations in their Sixty-first Report. Gist of important Observations/Recommendations in this Report is given as under:

- i. The Committee desired that the MNRE update their monitoring/coordination mechanism. The Committee desired to be apprised of the reasons for not taking appropriate measures towards developing a dedicated workforce and recommended that the MNRE should adopt systemic planning and exercise effective foresight in initiating such type of projects. The Committee also recommended that officials responsible for inaction in taking policy measures be suitably sensitized.
- ii. The Committee felt that had the issue been handled with care and foresight, the expenditure of ₹ 46.36 crore, incurred for completion of the project would have not become Infructuous. The Committee desired that the Ministry take appropriate measures, at least, now, with a view to ensuring that such issues are avoided in similar projects in future.
- iii. The Committee recommended that steps should be taken to revive the plant as a significant amount of tax payer's money i.e. ₹46.36 crore has been invested in implementing the project. The Committee further desired that the Ministry should explore the possibility of improving the technology of this plant so that it can contribute towards strengthening solar power generation.

- iv. The Committee emphasised that the MNRE should follow a systemic planning by taking into consideration all variables like availability of resources, credibility of implementing agency based on past performance, time frame for completion of projects, maintenance and financial viability of the project etc. at the planning stage of such type of projects so as to avoid delay in completing/execution of the projects in future.
- v. The Committee noted with concern that no serious interest seems to have been taken for making the plant functional as recommended by the Governing council of NISE. The Committee recommended that the MNRE should take necessary measures towards revamping the plant and making it functional.
- vi. The Committee desired to be apprised of the number of research projects sanctioned till date; expenditure incurred thereon; output there from; and institutions involved therein.
- vii. IIT Jodhpur intended to constitute a consortium for producing 1 Megawatt of power by way of joining the facility of this Solar Thermal Power Plant and a Photo Voltaic Power Plant. While taking note of the interest towards operationalising the plant, the Committee desired to be informed about the progress made and the current status of this project. The Committee wished to be apprised of the commercial viability of this arrangement and the possibility of reviving and reusing the plant, as a whole.
- viii. The Committee desired to be apprised of the strategy formulated by MNRE towards achieving this target, action taken thereon and present status of power generation by means of both solar and wind energy till date.
- ix. The Committee took the view that had the feasibility of the project been evaluated objectively and comprehensively, the loss could have been avoided. The Committee therefore recommended that at least now, MNRE should explore the possibility of reviving the plant at the earliest and make it functional. The Committee, therefore, urge that instead of using this plant as a mere demonstration project for R&D, efforts need to be made for

studying the technology used in the other plants of similar nature that are being run successfully so as to enable in reviving the plant.

4. The Action Taken Notes furnished by the Ministry of New & Renewable Energy on respective Observations/Recommendations of the Committee contained in their Sixty-first Report have been reproduced in the relevant Chapters of this Report. The Committee will now deal with the action taken by the Government, on some of their Observations/Recommendations which either need reiteration or merit comments.

5. The Committee desire the Ministry of New & Renewable Energy to furnish Action Taken Notes in respect of Observations/ Recommendations contained in Chapter I of the Report, positively within six months of the presentation of the Report to the Parliament.

Recommendation at Para Nos. 3 - Dedicated workforce for the project

6. The Committee in their Report on the subject, had recommended as under:

The Committee note that although the National Advisory Council had suggested creating a dedicated workforce at the Solar Energy Centre (SEC) for running the plant after commissioning of the project, yet MNRE did not take any action in this regard. Consequently, the plant could not be run. As informed by MNRE, IIT Bombay had developed a dedicated workforce for engagement till the date of completion of the project and the expenses thereon were met from the project costs. After handing over to NISE on 7th March, 2015, NISE retained the workforce and operated the plant till August 2015 by using its own budgetary resources. But, the arrangement was not sustainable as NISE was newly formed and had very limited funds. The Committee are astonished to note that neither the Ministry took any steps towards knowing the fund requirements of NISE for this purpose nor did they try to resolve the issue of funding for creating a dedicated workforce for the project. This is indicative of lack of co-ordination between NISE and MNRE.

The Committee are of the view that NISE being a newly formed agency, the MNRE should have taken adequate steps towards providing proper guidance and

direction, as well as adequate funds to NISE. The Committee further note that NISE, in co-ordination with MNRE took initiatives towards operating the plant by means of floating EoI for engaging a third party in August 2015 and in August 2018, but no potential response was received. The Committee are of the view that it was essential on the part of MNRE to take appropriate, adequate and timely action in this regard more so, as NISE was identified as a potential agency for operation and maintenance of the plant for R&D purpose following the commissioning of the project. The Committee, therefore, desire that the MNRE update their monitoring/coordination mechanism so as to avoid such lapses in future. The Committee also find it to be inappropriate that while IIT, Bombay, in a written letter, had suggested that the Plant needs to be run on a continuous basis, no positive action was taken by the MNRE/NISE for ensuring continuous operation of this plant. The Committee desire to be apprised of the reasons for not taking appropriate measures towards developing of a dedicated workforce and recommend that henceforth the MNRE should adopt systemic planning and exercise effective foresight in initiating such type of projects so that similar lapses do not recur. Suitable/clear guidelines need to be developed and prescribed for these types of projects in future. The Committee also recommend that officials responsible for inaction in taking policy measures need to be suitably sensitized so that such happenings do not continue.

7. The Ministry of New & Renewable Energy in the Action Taken Notes has submitted as under:

"It was found that even after deployment of a dedicated workforce (although uneconomical), due to the technical reasons mainly lower radiation than the design condition, lower power outputs, lower optical efficiencies of both collector fields, and need for major repair/replacement different sub-systems, the sustainable operation of the plant was not possible. Besides, it was not even economical to run the plant therefore, the plant was not run on sustainable basis.

Even then, NISE engaged a team to revive the plant and the efforts resulted in making the plant partially operational during the first week of March in 2018. NISE was able to make the collectors to track the sun manually and some amount of steam was generated. However, sustained operation of the plant could not be achieved.

NISE made efforts to run the plant through a third party for which it invited the EOI titled '*For running solar thermal power plant set up at NISE*' in August 2015. However, due to poor response from a single party with unreasonable tariff of Rs. 39/kWh, the work could not be awarded.

MNRE has now revised the R&D scheme as **the Renewable Energy Research and Technology Development (RE-RTD) Programme** with the following monitoring mechanism: -

(i) The monitoring of the progress of the projects will be done by project monitoring committee (PMC) comprising of the experts identified by MNRE. IFD representative may also be included in the PMC, if required.

(ii) The achievements claimed under the projects will be subjected to validation of the technology/process so that appropriate action is taken on furthering the technology development and demonstration in the area. On completion, the outcome of the project will be screened by expert committee to be constituted with the approval of RDPAC. The achievements will be subjected to measurements in relevant accredited test labs in the country or outside country.

(iii) In addition, interactive meets, R&D Conclaves will be organized annually to share the achievements with researchers, experts from R&D/academic institutions/industries, and other related stakeholders for taking corrective steps for improvement in implementation of projects.

Ministry has taken care that in any demonstration project, there must be performance evaluation and running cost at a particular time with dedicated manpower and instruction in this regard has also been reflected in R&D Project Appraisal Committee (RDPAC). For demonstration research projects, operation and maintenance budget provision may also be provided."

8. Noting that the plant could not be run as the Ministry neither took any steps towards knowing the fund requirements for NISE for maintaining a dedicated workforce nor did they try to resolve the issue of funding for creating a dedicated workforce for the project, the Committee had found that there was lack of co-ordination between NISE and MNRE. The Committee had desired that

the MNRE update their monitoring/coordination mechanism so as to avoid such lapses in future. The Committee further found lack of any positive action by the MNRE/NISE for ensuring continuous operation of the plant as suggested by IIT Bombay to be inappropriate and desired to be apprised of the reasons for not taking measures for developing a dedicated workforce and recommended that the MNRE may adopt systemic planning, and exercise effective foresight in initiating such projects and prescribe suitable/clear guidelines for the same. The Committee had also recommended that officials responsible for inaction be suitably sensitized to avoid recurrence of such lapses. The Committee take note from the action taken notes of the Ministry that NISE had made efforts to run the plant through a third party by inviting EOI in August 2015 but due to poor response with unreasonable tariff proposed from a single party, could not award the work. While the Committee note from the submissions of the Ministry that the R&D Scheme has been revised by MNRE as "the Renewable Energy Research and Technology Development (RE-RTD) Programme" with enhanced monitoring mechanism, they feel that the issue of lack of coordination between MNRE and implementing agencies has not been sufficiently addressed. The Committee, therefore, desire that detailed guidelines for systemic planning, strict compliance of the R&D guidelines, a robust mechanism for ensuring coordination amongst various agencies be developed so as to ensure that appropriate, adequate and timely action is taken in implementation of such projects without incurring extra financial liability. The Committee further desire to be apprised of the specific efforts made to sensitize the officials responsible to avoid recurrence of such lapses.

Recommendation at Para Nos. 9 - Steps taken for Revival of Plant by IIT Jodhpur

9. The Committee in their Original Report had recommended as under:

During the oral evidence of the representatives of MNRE on the subject, the Committee have been informed that IIT Jodhpur has expressed interest in the revival of this plant. IIT Jodhpur intend to constitute a consortium for producing 1 Megawatt of power by way of joining the facility of this Solar Thermal Power Plant and a Photo Voltaic Power Plant and enter into a PPA with an Electricity purchasing company in Jodhpur, at

a tariff of Rs. 8/kWh. While taking note of the interest towards operationalizing the plant, the Committee would also like to be informed about the progress made in this regard and the current status of this project. The Committee wish to be apprised of the commercial viability of this arrangement and the possibility of reviving and reusing the plant, as a whole.

10. The Ministry of New & Renewable Energy in the Action Taken Notes has submitted as under:

"IIT Jodhpur has shown the interest to take this power plant for further research and development in solar energy sector. IIT Jodhpur presented that a PV-CSP Hybrid power plant with storage is proposed in consortium with Industry M/s Luit Renewable Solutions Pvt. Limited New Delhi. Ministry has considered the proposal on merit.

As proposed project would be a hybrid of PV and CSP, it's design would allow about 16 hours of operation, thereby, producing approximately 16 MWhe per day. During day period, PV will generate electricity and feed into the IIT Jodhpur campus grid while after sunset, the stored thermal energy would be utilized to run the turbine and feed electricity for 8 hours after sunset. A preliminary DPR has been received from IIT Jodhpur and the Ministry has accorded approval to NISE to transfer the entire facility to IIT Jodhpur for further research and running of the plant with storage facility. NISE will transfer the facility to IIT Jodhpur shortly. NISE will be fully involved during the research work and MNRE will ensure the implementation and regular monitoring through a Project Monitoring Committee. The entire arrangement will be at no cost to either MNRE or NISE.

An agreement between IIT Jodhpur and M/s Luit Renewable Solutions Pvt. Limited New Delhi has been finalised for purchase of power at Rs. 6.93/kWh. This will perhaps ensure the reusing of the entire facility and commercial viability of the project."

11. Observing that IIT Jodhpur has expressed interest in the revival of plant whereby the Institute intended to constitute a consortium for producing 1

Megawatt of power by way of joining the facility of the Solar Thermal Power Plant and a Photo Voltaic Power Plant and enter into a PPA with an Electricity purchasing company in Jodhpur, the Committee had desired to be informed of the progress made in this regard and the current status of the project. The Committee take note from the action taken notes submitted by the Ministry, that IIT Jodhpur had proposed a PV-CSP Hybrid power plant with storage in consortium with Industry M/s Luit Renewable Solutions Pvt. Limited, New Delhi and the Ministry has considered the proposal on merit. The Committee also take note from the Ministry's submissions that NISE would transfer the facility to IIT Jodhpur shortly and be fully involved during the research work and ensuring the implementation and monitoring by MNRE through a Project Monitoring Committee. The MNRE has neither provided any timeline for completion of the transfer of the facility from NISE to IIT Jodhpur nor any updates in regard to progress made in effecting this arrangement. The Committee desire to be apprised of the present status of the arrangement. The Committee also urge upon the Ministry to expedite the transfer of the facility within a specified timeline with a view to avoiding further wastage of a facility developed with public money.

CHAPTER II

OBSERVATIONS/RECOMMENDATIONS WHICH HAVE BEEN ACCEPTED BY THE GOVERNMENT

Observation/ Recommendation

The Committee note that although the National Advisory Council had suggested creating a dedicated workforce at the Solar Energy Centre (SEC) for running the plant after commissioning of the project, yet MNRE did not take any action in this regard. Consequently, the plant could not be run. As informed by MNRE, IIT Bombay had developed a dedicated workforce for engagement till the date of completion of the project and the expenses thereon were met from the project costs. After handing over to NISE on 7th March, 2015, NISE retained the workforce and operated the plant till August 2015 by using its own budgetary resources. But, the arrangement was not sustainable as NISE was newly formed and had very limited funds. The Committee are astonished to note that neither the Ministry took any steps towards knowing the fund requirements of NISE for this purpose nor did they try to resolve the issue of funding for creating a dedicated workforce for the project. This is indicative of lack of co-ordination between NISE and MNRE.

The Committee are of the view that NISE being a newly formed agency, the MNRE should have taken adequate steps towards providing proper guidance and direction, as well as adequate funds to NISE. The Committee further note that NISE, in co-ordination with MNRE took initiatives towards operating the plant by means of floating EoI for engaging a third party in August 2015 and in August 2018, but no potential response was received. The Committee are of the view that it was essential on the part of MNRE to take appropriate, adequate and timely action in this regard more so, as NISE was identified as a potential agency for operation and maintenance of the plant for R&D purpose following the commissioning of the project. *The Committee, therefore, desire that the MNRE update their monitoring/coordination mechanism so as to avoid such lapses in future.* The Committee also find it to be inappropriate that while IIT, Bombay, in a written letter, had suggested that the Plant needs to be run on a continuous basis, no positive action was taken by the MNRE/NISE for ensuring continuous operation of this plant. The Committee desire to be apprised of the reasons for not taking appropriate measures towards developing of a dedicated workforce and recommend that henceforth the MNRE should adopt systemic planning and exercise effective foresight in initiating such type of projects so that similar lapses do not recur. Suitable/clear guidelines need to be developed and prescribed for these types of projects in future. The Committee also recommend

that officials responsible for inaction in taking policy measures need to be suitably sensitized so that such happenings do not continue.

(Para. 3 of the Part II
Report of the Public Accounts Committee
(17th Lok Sabha)

Action Taken by Government

It was found that even after deployment of a dedicated workforce (although uneconomical), due to the technical reasons mainly lower radiation than the design condition, lower power outputs, lower optical efficiencies of both collector fields, and need for major repair/replacement different sub-systems, the sustainable operation of the plant was not possible. Besides, it was not even economical to run the plant therefore, the plant was not run on sustainable basis.

Even then, NISE engaged a team to revive the plant and the efforts resulted in making the plant partially operational during the first week of March in 2018. NISE was able to make the collectors to track the sun manually and some amount of steam was generated. However, sustained operation of the plant could not be achieved.

NISE made efforts to run the plant through a third party for which it invited the EOI titled '*For running solar thermal power plant set up at NISE*' in August 2015. However, due to poor response from a single party with unreasonable tariff of Rs. 39/kWh, the work could not be awarded.

MNRE has now revised the R&D scheme as **the Renewable Energy Research and Technology Development (RE-RTD) Programme** with the following monitoring mechanism: -

- (i) *The monitoring of the progress of the projects will be done by project monitoring committee (PMC) comprising of the experts identified by MNRE. IFD representative may also be included in the PMC, if required.*
- (ii) *The achievements claimed under the projects will be subjected to validation of the technology/process so that appropriate action is taken on furthering the technology development and demonstration in the area. On completion, the outcome of the project will be*

screened by expert committee to be constituted with the approval of RDPAC. The achievements will be subjected to measurements in relevant accredited test labs in the country or outside country.

- (iii) *In addition, interactive meets, R&D Conclaves will be organized annually to share the achievements with researchers, experts from R&D/academic institutions/industries, and other related stakeholders for taking corrective steps for improvement in implementation of projects.*

Ministry has taken care that in any demonstration project, there must be performance evaluation and running cost at a particular time with dedicated manpower and instruction in this regard has also been reflected in R&D Project Appraisal Committee (RDPAC). For demonstration research projects, operation and maintenance budget provision may also be provided.

(Ministry of New and Renewable Energy, OM. No. 354/12/2019-NSM dated 30.01.2024)

Observation/Recommendation

The Committee are constrained to observe that the plant was taken over from IIT, Bombay by MNRE before getting the project performance appraised by the RDPAC. The MNRE, however, indicated that the project was appraised by the R&D Sectoral Project Appraisal Committee on Solar Thermal on 07-08-2013 wherein the RDPAC observed that most of the project goals had been achieved. The reasoning given by the Ministry that the project was ending in 2015, owing to which it was felt that obtaining approval of RDPAC prior to the timeline is not tenable. The entire responsibility is sought to be put on NISE on the ground that the project was completed with NISE as a responsible consortium partner is also not totally justifiable. The manner in which the Ministry took over the plant from IIT, Bombay without getting the performance appraised by RDPAC and placing the responsibility of operation and maintenance on NISE without assessing the requirements of NISE for enabling in sustained functioning of the Plant is, in the opinion of the Committee incorrect. The MNRE do not appear to have taken this issue seriously till the lapse was pointed out by Audit and that too after a significant time gap, and incurring an expenditure to the tune of Rs. 46.36 crore. The Committee

consider it be unfortunate that no efforts were made by MNRE for obtaining the 'completion Report', which is an essential requirement in the process of handing over a project. The Committee feel that had the issue been handled with care and foresight, the expenditure of Rs. 46.36 crore, incurred for completion of the project could have not become infructuous. The Committee, therefore, desire the Ministry to take appropriate measures, at least, now, with a view to ensuring that such issues are avoided in similar projects in future.

(Para 4 of the Part II
Report of the Public Accounts Committee (17th Lok Sabha)

Action Taken by Government

The plant was handed over to NISE after the review and recommendation of RDPAC in meeting held on August 2013 in which the Committee observed that most of the project goals had been achieved. The project had resulted in facility which offers unique opportunity to gain a lot of experience in operation, vendor management and generating performance data.

Since, NISE was the one of the consortium partners for the project, the R&D project had been completed with extension, and the project was in NISE campus, accordingly, the MNRE found NISE as responsible agency for its operation and maintenance after the end of project period.

Performance appraisal of a Research and Development (R&D) project is crucial to ensure that it meets its objectives, stays on track, and contributes effectively to an organization's innovation goals

This was an R&D project, first of its kind solar thermal power plant which was established and performance appraisal was done by the committee of pioneer experts in the area of solar thermal Chaired by Prof. S. Srinivasa Murthy, IIT Madras and the external members were Prof. K. Chattopadhyay, IISc Bangalore, Prof. T.C. Kandpal, IIT Delhi, Dr. H.S. Jain, Former ED BHEL Hyderabad, Prof. N.K. Bansal Former VC, SMVD University. The Committee noted/observed the following :

- *"All major components of the power plant have been installed and tested for its functionality. This includes testing of turbine using steam generated from the solar*

field comprised of parabolic trough solar collectors and linear Fresnel reflectors. Power evacuation from the solar plant would start as soon as the weather conditions become favourable.

- An oil test rig has been installed and commissioned at project site for evaluation of thermal performance of concentrators. Presently, trial runs are being performed on a paraboloid dish called Arun supplied by Clique Developments Pvt. Ltd., Mumbai.*
- A flux mapping system has been designed for measuring the concentrated flux obtained from linear focusing solar collectors. This is a novel low cost technique, and can be effective in laboratory environment as well as outdoor conditions. A Patent has been filed on this system.*
- The preliminary version of the simulator was released in July 2011, and subsequently its Evaluation Version v 1.0 was released in November-2012*

The committee observed that most of the project goal have been achieved. The project has resulted in facility which offers unique opportunity to gain a lot of experience in operation, vendor management and generating performance data. However, future of facility in terms of assigning responsibility for its operation and maintenance after the project period ends need quick address by the Ministry. In terms of utilization, the facility has high potential for research work aiming at cost effective solar thermal power generation, manpower training and component testing. The Committee suggested Ministry to take view in the matter”

Ministry has now revised R&D scheme through an external panel of Experts under the Chairmanship of Dr. Anil Kakodkar, (Former Chairman, Atomic Energy Commission and Secretary to the Government of India). The following were the policy recommendations:

- The Ministry should invite competitive proposals from industry in collaboration with academia/research institutions that could deliver on a specified user need while pushing the technology envelope.*
- Deliverables including the performance and qualification requirements should be clearly spelt out.*
- There should be independent test houses to ascertain performance of products developed.*
- There should be support for guaranteed purchase up to a specified quantum provided the products meet the specified qualification and the price.*
- The focus of science departments (DST) could be on laboratory development leading to proof-of concept level development and that of user ministries should be on commercialisation / market entry of a developed technology.*

MNRE therefore should focus on upgrading the technology from low Technology Readiness Level (TRL) to high TRL ready for commercialisation.

- Support for 100% grant for the industry is important and should be incorporated in the policy. A project can be evaluated and funded according to the gap in viability. For industry, funding should be in graded manner, 100% for first level research and 50% for prototype/product developmental research and viability gap funding for larger size demonstration projects.*
- Involvement of the industry from the initial level of R&D should be high. This will expedite commercialization of technology.*
- Ministry should aim at allocating a higher budget and more projects should be taken up be in a time bound manner.*

Accordingly, Ministry has revised the scheme as the Renewable Energy Research and Technology Development (RE-RTD) Programme in December 2021. Suggestions of the committee have been noted.

(Ministry of New and Renewable Energy, OM. No. 354/12/2019-NSM dated 30.01.2024)

Observation/ Recommendation

The Committee further find that no action could be initiated for sale of 1Mwe Solar Power planned to be generated from the plant. In this regard, the Committee have been informed that NISE initiated actions and approached Dakshin Haryana Bijli Vitran Nigam (DHBVN) for facilitating in feeding the power to the grid. Although, NISE made efforts towards signing of PPA for Power evacuation with Haryana Power Purchase Centre at the rate of Rs. 6.44 per KWh as per the provision made for Solar Photovoltaic power in April 2015, no formal response was received. Further, as apprised by the MNRE, while NISE was operating the plant from March, 2015 to August, 2015, it was found that the power output was much lower than the designated value of 1.0Mwe and operating the plant was uneconomical. Consequently, the plant became non-operational from 1st September 2015 and no further action was initiated by NISE for signing of PPA with Haryana Power Purchase Centre. During the course of evidence, the representative of MNRE informed the Committee that the project was mainly R&D oriented, power generation was not the main objective of this project, and it was not commercially viable for being run for a long time. The Committee note in this regard that when the decision was taken at first

to build this project, the basic objective stated was to generate 1Mwe solar power. It was only after the project proved to be commercially unviable that it has been formed as a R&D project. The Committee feel that if the plan was to conceive the plant as only R&D oriented, the MNRE should have satisfied the audit about the objectives of the plant so that the Audit would have made a suitable Observation and the Committee would not have been seized of the matter. A representative of MNRE too accepted and stated during evidence that if the sanction given was for generating 1 MW electric power, it should have been generated, at least for a couple of years. The Committee, recommend in this regard that steps should be taken to revive the plant as a significant amount of tax payer's money i.e. Rs. 46.36 crore has been invested in implementing the project, which remained wasted as there is no generation of energy. The Committee further desire that the Ministry should explore the possibility of improving the technology of this plant so that it can contribute towards strengthening solar power generation.

(Para. 5 of the Part II
Report of the Public Accounts Committee
(17th Lok Sabha)

Action Taken by Government

As already mentioned that even after deployment of a dedicated workforce (although uneconomical), due to the technical and financial reasons mainly lower radiation than the design condition, lower power outputs, lower optical efficiencies of both collector fields, and need for major repair/replacement different sub-systems, high and unviable O&M cost the sustainable operation of the plant was not possible. Hence, there was no possibility of further research in the plant.

The plant was used for successful demonstration of the technology. The technology has worked but the cost was very high. Therefore, it was used for as example for successful technology for training and demonstration. Ministry is also exploring the possibility of improving the technology of solar thermal plant as per latest technological development. IIT Jodhpur has shown interest to utilise the assets of this plant in developing a solar thermal plant with storage in combination with solar PV. The transfer of the assets to IIT Jodhpur is in progress.

As suggested by the committee, the further research will be carried out by IIT Jodhpur and NISE will also be associated in the research with IIT Jodhpur. MNRE will also monitor the research work on regular basis with NISE.

(Ministry of New and Renewable Energy, OM. No. 354/12/2019-NSM dated 30.01.2024)

Observation/ Recommendation

There was long delay of eight years (September 2009 to 2017) in making the Solar Thermal Power Plant functional. From the information furnished by MNRE, the Committee note that following the sanction on 7th September, 2009, the project was in the execution phase till September, 2014, which was further extended till 6th March, 2015.

The information furnished by the Ministry is also silent on the reasons for delay of three years in operationalizing this Solar Thermal Power Plant (STPP), as well as escalation in cost of plant, i.e., from Rs. 41.17 crore sanctioned in 2009 to Rs. 46.72 crore till 2015. Lack of foresight and proper planning seem to be the reasons behind the delay in making the plant functional and the consequent loss of expenditure incurred thereon. The Committee, therefore, emphasise that, henceforth, the MNRE should follow a systemic planning by taking into consideration all variables like availability of resources, credibility of implementing agency based on past performance, time frame for completion of projects, maintenance and financial viability of the project etc. at the planning stage of such type of projects so as to avoid delay in completing/execution of the projects in future.

(Para. 6 of the Part II
Report of the Public Accounts Committee
(17th Lok Sabha)

Action Taken by Government

The project was sanctioned in September 2009 and was handed over to NISE on 6th March 2015. It was run by NISE till August 2015. Hence, there was not a long delay. Thereafter, the efforts were made by NISE in September 2017 till March 2018 to revive the plant and make it commercially viable to at least recover the O&M cost. The suggestions of the committee have been noted to follow a systemic planning of R&D projects. Accordingly, the present revised R&D guidelines envisage a proper systemic planning by taking into

consideration all variables like availability of resources, credibility of implementing agency based on past performance, time frame for completion of projects, maintenance and financial viability of the project etc. at the planning stage of such type of projects.

(Ministry of New and Renewable Energy, OM. No. 354/12/2019-NSM dated 30 .01.2024)

Observation/ Recommendation

The Committee note that during 2015 to 2017, the plant was nonoperational on account of administrative, financial and technical reasons. The facility was used for training and demonstration purpose since its commissioning. The Committee are constrained to observe that though NISE had taken several steps viz. engaging a team to revive the plant, making the collectors to track the sun manually, approaching the MNRE for seeking funds, facilitating a study which was conducted through consultants appointed by the United Nations Industrial Development Organisation (UNIDO) during January to March 2019 for assessing the technical problems associated with solar field power block, other major accessories and software for reviving the operation of the plant, it could not be made functional. The Committee have also been apprised by the MNRE that a detailed Report titled 'Refurbishment of the 1.0 Mwe Concentrating Solar Power Plant at the NISE' was prepared and presented to MNRE in the last week of March, 2019, which detailed the various components, parts/systems to be overhauled/repaired/replaced along with the financial implication on account of making the plant operational. Further, the Governing Council of NISE in the 8th Meeting held on 20-06-2019, recommended that efforts should be made to make the plant functional preferably on economical basis for recovering the cost of O&M through electricity generation from the project. The Committee are concerned to note in this regard that no serious interest seems to have been taken for making the plant functional as recommended by the Governing council of NISE. The Committee recommend that the MNRE should take necessary measures towards revamping the plant and making it functional.

(Para. 7 of the Part II
Report of the Public Accounts Committee
(17th Lok Sabha)

Action Taken by Government

For revamping of the plant, a detailed study was conducted by NISE through consultants (one from Germany and another from India) appointed by the United Nations Industrial Development Organization (UNIDO) during January to March, 2019 for assessing the technical problems associated with solar field, power block, other major accessories and

software for reviving the operation of the plant and to estimate requirement of funds for this purpose. The study report titled '*Refurbishment of the 1.0 MWe Concentrating Solar Power Plant at the NISE*' indicates about the various components, parts/systems to be overhauled/repaired/replaced along with financial implications for making the plant operational. The detailed list of the spares is also given in the report. The cost of renovation/refurbishment of the power plant was estimated about Rs. 3.22 crore and annual operation and maintenance cost was estimated about Rs. 74.20 lakh. The report was presented in the MNRE in the last week of March, 2019.

The MNRE took a considered decision indicating that "*The main objectives of this R&D project of 1.0 MWe Solar Thermal Power Plant have been achieved. The operation of this 1.0 MWe Solar Thermal Power Plant is not economically viable and feasible on sustainable basis. It cannot even recover operation and maintenance cost if operated on commercial basis. This project has encouraged the developers for development and deployment of solar thermal plant across the Country and as a result 3 solar thermal power plants with a total capacity of 225 MW were established which were operational in India.*" The decision of MNRE was conveyed to PAC in the background note submitted in August 2020 with the approval of Hon'ble Minister.

Thus, it was found that even after complete revival by spending another Rs. 3.22 crore and deployment of a dedicated workforce with annual expenditure of Rs. 74.20 lakh (although uneconomical), due to the technical and financial reasons mainly lower radiation than the design condition, lower power outputs, lower optical efficiencies of both collector fields, and need for major repair/replacement different sub-systems, high and unviable O&M cost the sustainable operation of the plant will not be possible, besides, the financial constraints of NISE. Therefore, the plant could not continue its operation.

The plant was used for successful demonstration of the technology. The technology has worked but the cost was very high. It was used for as example for successful technology for training and demonstration. Ministry has explored the possibility of improving the technology of solar thermal plant as per latest technological development in association

with IIT Jodhpur and the entire facility is being transferred to IIT Jodhpur for further research and running of the plant by incorporating the storage facility.

(Ministry of New and Renewable Energy, OM. No. 354/12/2019-NSM dated 30.01.2024)

Observation/ Recommendation

The Committee note that the Solar Thermal Power Project in its present condition is being utilized for demonstration and training purpose for the National and International training programmes being organised by NISE, besides having visitors and students to showcase PTC and LFR based solar thermal power plant technology. The Committee have been informed that till 2019-20, NISE organised 134 National and 36 international training programmes in the campus in which the facility was utilized for training and demonstration purposes. The Committee are of the view that it may not be appropriate to see any R&D project in isolated or 'non-functional state'. The Committee also wish to point out in this regard that Rs. 46.36 crore were spent on this single project which had not lead to any scientific R&D nor contributed to energy generation. Further, the Ministry have not apprised the Committee about the percentage of R&D Budget sanctioned for this purpose and actual R&D expenditure incurred thereon. The Committee desire to be apprised of the number of research projects sanctioned till date; expenditure incurred thereon; output there from; and institutions involved therein.

(Para. 8 of the Part II
Report of the Public Accounts Committee
(17th Lok Sabha)

Action Taken by Government

The major achievements of this R&D project sanctioned to IIT Bombay in terms of scientific R&D are given below:

- The objective of the project i.e., design and development of two different technology integrated 1.0 MWe grid interactive solar thermal power plant and development of indigenous technology and capability through continuous experimentation and research have been achieved. The integration of PTC and LFR technology for power generation in the plant was conceptualized and demonstrated for first time in the Country.

- The project encouraged the developers, who visited the project and interacted with team of IIT Bombay for development and deployment of solar thermal power plant across the Country. As a result, following 3 solar thermal power plants with a total capacity of 225 MW were established with the learnings from this project in India:
 - i. 125 MW plant (LFR technology) in Dhursar, Rajasthan completed in 2014
 - ii. 50 MW plant (PTC technology) in Nokh Village, Rajasthan completed in 2013
 - iii. 50 MW plant (PTC technology) in Anantpur, AP completed in 2014

- The test facility designed, fabricated and commissioned for its use as a test bed for concentrating collectors was first of its kind in India. The test rig includes an oil circuit and a water circuit interlinked through a heat exchanger. The principle of operation is the transfer of heat between hot thermic oil and cold water to give out energy extracted from sun. The testing was conducted for a parabolic dish concentrator (ARUN 100) supplied by Clique Development Ltd.

- A solar thermal simulation package developed based on learning of this plant is in public domain (<http://www.es.e.iitb.ac.in/oldweb/simulator/simulator.html>) and is being utilized for designing of solar thermal power plants in the country. The preliminary version of the simulator was released in July 2011 that was downloaded in 250 institutes, 450 industry and other organisation across 24 countries. The evaluation version v 1.0 of the solar thermal simulator released in November 2012 that is being used by Tata Power also. The simulator was used by NETRA-NTPC and was made available to L&T. The Evaluation License for testing of the version was given to Fitchner India Pvt Ltd. The solar simulator Version 2.0 has been downloaded by 991 persons Universities/Industry/Govt. Agencies/Individuals from all over the world.

The R&D projects are sanctioned to various R&D/academic institutions, industries etc. following the MNRE's policy and guidelines. During period from 2017-18 to 2020-21 Period, 35 nos. of R&D projects in solar thermal, solar PV, biogas/biogas purification, bio-fuel, hydrogen and fuel cells were sanctioned with total allotted budget of Rs. 188.00 crore to various R&D/academic institutions, industries, etc. and an expenditure of Rs. 130.00 crore was incurred. A total no. of 206 research papers in National Journals and International Journals were published during the period of 2017-18 to 2020-2021. 14 patents were also registered. The major outcomes of these research activities are given below:

i. Solar cell

- High efficiency crystalline silicon solar cell of 19.4% efficiency was achieved under a National Centre of Photovoltaic Research and Educations (NCPRE) project at IIT, Bombay
- BHEL has developed high efficiency PERC solar cell with targeted efficiency of 21.4%.
- IIT Bombay has developed pervoskite solar cell with 21% efficiency
- Indigenous Silicon ingot has been prepared at SSN College of Engineering in Tamil Nadu

ii. Solar system

- Cost effective reliable Solar-powered Clean Drinking Water Systems suitable for various locations are installed in the different part of the country by NISE, Gurugram.
- PV powered induction motor-pump set for irrigation by IIT Bombay
- The All India Survey of PV Module Reliability by IIT Bombay

iii. Solar thermal

- 1MWe Solar Thermal Power Plant with 16 hours thermal storage has set up at Mount Abu by World Renewable Spiritual Trust (WRST), Mumbai which is running successfully.
- IISc Bangalore has developed a supercritical CO₂ Turbomachinery along with high efficiency receiver for solar thermal power plants

- Central Tassar Research & Training Institute (C.T.R & T.I) Ranchi, Jharkhand has successfully developed solar energy systems for Trasar post cocoon technology operations.
- CSIR-Central Salt & Marine Chemicals Research Institute, Bhavnagar, Gujarat and NIT Agartala has developed a 5 Kg solar dryer installed at NIT-Agartala for drying of natural rubber sheets as demonstration unit.

iv. Biogas and biomass

- Conducted studies on assessment of biomethane potential of paddy straw and biomass characterization.
- Pretreatments of paddy straw, evaluation and comparison of biogas production potential at laboratory and field scale anaerobic reactors
- Development of hybrid high rate biomethanation reactor with locally available media for treating waste water and solid waste.
- Developed a 3 kWe Biogas based power generation system utilizing Lignocellular biomass.

v. Wind Energy

- Met-Ocean Measurements (Wind, Wave, Tide, Current, Water Level, etc.) at Gulf of Khambhat and Gulf of Mannar for fostering the growth of offshore wind in the country.
- Integrated Wind and Solar Resource Assessment through Mapping and Measurements

vi. Hydrogen and Fuel cell

- Maximize the gaseous energy recovery from organic wastes through Biohythane process
- Design and developed the porous graphene modified metal oxide photo anode for photo electro chemical water splitting
- 1 kW Low Temperature Polymer Electrolyte Membrane (LT-PEM) fuel cell sent to IOCL is 80W/Kg and 70W/l, 110mW/sq.cm

The R&D scheme of MNRE has been revised with stringent monitoring mechanism in December 2021 with a budget outlay of Rs. 228 crore for a period till 2025-26.

(Ministry of New and Renewable Energy, OM. No. 354/12/2019-NSM dated 30.01.2024)

Observation/ Recommendation

During the oral evidence of the representatives of MNRE on the subject, the Committee have been informed that IIT Jodhpur has expressed interest in the revival of this plant. IIT Jodhpur intend to constitute a consortium for producing 1 Megawatt of power by way of joining the facility of this Solar Thermal Power Plant and a Photo Voltaic Power Plant and enter into a PPA with an Electricity purchasing company in Jodhpur, at a tariff of Rs. 8/kWh. While taking note of the interest towards operationalizing the plant, the Committee would also like to be informed about the progress made in this regard and the current status of this project. The Committee wish to be apprised of the commercial viability of this arrangement and the possibility of reviving and reusing the plant, as a whole.

(Para. 9 of the Part II
Report of the Public Accounts Committee
(17th Lok Sabha)

Action Taken by Government

IIT Jodhpur has shown the interest to take this power plant for further research and development in solar energy sector. IIT Jodhpur presented that a PV-CSP Hybrid power plant with storage is proposed in consortium with Industry M/s Luit Renewable Solutions Pvt. Limited New Delhi. Ministry has considered the proposal on merit.

As proposed project would be a hybrid of PV and CSP, it's design would allow about 16 hours of operation, thereby, producing approximately 16 MWhe per day. During day period, PV will generate electricity and feed into the IIT Jodhpur campus grid while after sunset, the stored thermal energy would be utilized to run the turbine and feed electricity for 8 hours after sunset. A preliminary DPR has been received from IIT Jodhpur and the Ministry has accorded approval to NISE to transfer the entire facility to IIT Jodhpur for further research and running of the plant with storage facility. NISE will transfer the facility to IIT Jodhpur shortly. NISE will be fully involved during the research work and MNRE will ensure the implementation and regular monitoring through a Project Monitoring Committee. The entire arrangement will be at no cost to either MNRE or NISE.

An agreement between IIT Jodhpur and M/s Luit Renewable Solutions Pvt. Limited New Delhi has been finalised for purchase of power at Rs. 6.93/kWh. This will perhaps ensure the reusing of the entire facility and commercial viability of the project.

(Ministry of New and Renewable Energy, OM. No. 354/12/2019-NSM dated 30.01.2024)

CHAPTER III

**OBSERVATIONS/RECOMMENDATIONS WHICH THE COMMITTEE DO NOT
DESIRE TO PURSUE IN VIEW OF THE REPLIES RECEIVED FROM THE
GOVERNMENT**

-NIL-

CHAPTER IV

**OBSERVATIONS/RECOMMENDATIONS IN RESPECT OF WHICH REPLIES OF
GOVERNMENT HAVE NOT BEEN ACCEPTED BY THE COMMITTEE AND WHICH
REQUIRE REITERATION**

-NIL-

CHAPTER V

OBSERVATIONS/RECOMMENDATIONS IN RESPECT OF WHICH GOVERNMENT
HAVE FURNISHED INTERIM REPLIES

-NIL-

NEW DELHI;
07 February, 2024
18 Magha, 1945 (Saka)

ADHIR RANJAN CHOWDHURY
Chairperson,
Public Accounts Committee

(APPENDIX – II)

(Vide para 5 of Introduction)

ANALYSIS OF THE ACTION TAKEN BY THE GOVERNMENT ON THE OBSERVATIONS/RECOMMENDATIONS OF THE PUBLIC ACCOUNTS COMMITTEE CONTAINED IN THEIR SIXTY FIRST REPORT (SEVENTEENTH LOK SABHA)

- | | | | |
|-------|---|---|--|
| (i) | Total No of Observations/Recommendations | - | 09 |
| (ii) | Observations/Recommendations of the Committee which have been accepted by the Government: | - | Total: 09
Percentage – 100% |
| | <i>Para Nos. 3 to 11</i> | | |
| (iii) | Observations/Recommendations which the Committee do not desire to pursue in view of the replies received from the Government: | - | Total: Nil
Percentage - 0% |
| | <i>-Nil-</i> | | |
| (iv) | Observations/Recommendations in respect of which replies of Government have not been accepted by the Committee and which require reiteration: | - | Total: Nil
Percentage– 0% |
| | <i>-Nil-</i> | | |
| (v) | Observations/Recommendations in respect of which Government have furnished interim replies: | - | Total: Nil
Percentage –0% |
| | <i>-Nil-</i> | | |