

No. J-11013/41/2006-IA.II(I)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003.
Telefax: 24362434

Dated the 30th June, 2011

OFFICE MEMORANDUM

Sub: Environment Clearance for setting up of Solar Thermal Power Plants under JNNSM – applicability of EIA Notification, 2006 – Regarding.

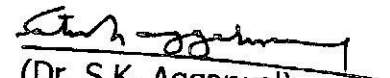
Ministry of New and Renewable Energy (MNRE) has brought to the notice of this Ministry that the State Pollution Control Boards have been asking for obtaining prior environment clearance in respect of Solar Thermal Power Projects as according to them, these projects get covered under Category 8(b) of the schedule to the EIA Notification, 2006. The matter has been examined in the Ministry of Environment & Forests, in the light of the technical and scientific information provided by MNRE vide their letter no. 29/1(1)/2011-12/JNNSM(ST) dated 22.6.2011 (copy enclosed).

2. It is clarified that Solar Thermal Power Projects are not covered by the provisions of EIA Notification, 2006. However, keeping in view the extent of land required for such projects, it has been decided that:

- State Pollution Control Board / UTPCC before issuing consent to establish under Air and Water Act to such units may ensure and satisfy themselves by undertaking a site visit that the proposed area does not involve; (i) any wet land, (ii) any agriculture land, (iii) ecologically sensitive area, (iv) areas rich in bio-diversity, (v) areas with large habitation. In case, any displacement of habitation is involved, the requisite R&R and CSR should be put in place as per the norms of the respective State Government. Further, if the area involves any forestland, it needs to be ensured that the requisite prior forestry clearance for diversion of forestland has also been obtained under FC Act.
- In addition, the site should also conform to the provisions of the CRZ Notification, 2011. Under the CRZ Notification, 2011, this activity will be prohibited in the CRZ area.
- It also needs to be ensured that the requisite prior commitment from the Competent Authority for availability of requisite quantity of water for the project is available with the proponent.
- The land so made available for the solar thermal power plant will not be deviated for any other purpose and no change of land use what so ever will be permitted without obtaining requisite clearance from the Competent Authority as applicable.
- All other clearances as may be applicable from other Regulatory Authorities under various Rules and Regulations inter-alia consent under HSM Rules etc. should be available before issue of consent by the SPCB.

3. Further, CPCB will, separately, make a study on some illustrative aspects of the actual environmental impacts of these Solar Thermal Power Plants and Solar Photovoltaic Plants with a view to report to MoEF during and after setting up of these plants i.e. construction phase and implementation phase. The SPCBs may also be kept involve in such studies to be undertaken by CPCB.

This issues with the approval of the Competent Authority.


(Dr. S.K. Aggarwal)
Director

To

1. Secretary, Ministry of New and Renewable Energy, Block no. 14, CGO Complex, Lodi Road, New Delhi-110 003.
2. All the Officers of IA Division
3. Chairpersons / Member Secretaries of all the SEIAAs/SEACs
4. Chairman, CPCB
5. Chairpersons / Member Secretaries of all SPCBs / UTPCCs

Copy to:-

1. PS to MEF
2. PPS to Secretary (E&F)
3. PPS to SS(JMM)
4. Advisor (NB)
5. Website, MoEF
6. Guard File

भारत सरकार

नवीन और नवीकरणीय ऊर्जा मंत्रालय

Government of India

MINISTRY OF NEW AND RENEWABLE ENERGY

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सं.

No.

29/1(1)/2011-12/JNNSM(ST)

दिनांक

Dated

22/06/2011

Shri J. M. Mauskar
Special Secretary
Ministry of Environment of Forests
R. No. 412, 4th Floor, Paryavaran Bhawan,
CGO Complex, Lodhi Road, N.Delhi- 110003

Subject: Environment clearance for setting up Solar Thermal Power Plants under JNNSM

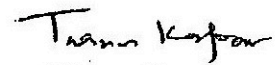
Sir,

The matter refers to the representation received from Forum for Advancement of Solar Thermal (FAST) dated 12/05/2011 regarding environmental clearance for solar power projects and subsequent discussions of the MNRE and MoEF. The information provided by the solar project developers has been examined in the Ministry and a note has been prepared that covers some aspects of the solar thermal power technology and information on the environmental aspects. The note is enclosed herewith.

2. It is recommended by the Ministry that the solar thermal power projects may be exempted from Environmental Clearance requirements as

- i) Solar power is clean power and environment friendly.
- ii) The land used for the project is not subjected to much change or development and most of the land is used for installing solar collectors only.
- iii) There are no polluting emissions or discharges in air or water bodies.

3. Early consideration of the matter is requested in order to be able to meet stringent time schedule set for the Mission targets.



(Tarun Kapoor)
Joint Secretary (NSM)
011-24360359

Encl: As above

A Note on Solar Thermal Power Plants for Environmental Clearance

Main Features

The technology of solar thermal power generation is based on the principle of producing steam by concentrating the solar radiation from a large area onto a smaller area and then turning a turbine in similar fashion as in a conventional thermal plant. The solar field, thus, is a replacement of the boilers or heaters using fossil fuels in a conventional thermal plant with balance of system remaining similar. In solar dish-Stirling technology, power is produced directly using concentrated solar heat in a Stirling engine, which is an external combustion engine.

Solar thermal power plants were built during late eighties in USA and these plants are still working to produce power. There have been a steep growth in this sector in the last couple of years and substantial capacities have been installed, especially in Spain. Presently, over 1200 MW capacity solar thermal power plants are in operation globally, and around 2000 MW capacity plants are under construction. The technology has been proven and has enormous potential for the locations blessed with solar energy.

India, located in subtropical zone has plenty of sunshine in most parts and for very good number of days in the year, and therefore, solar technologies have high relevance. This is the background to prompt Government of India to launch Jawaharlal Nehru National Solar Mission, which is one of the eight missions as a part of National Action Plan on Climate Change. This note discusses various features of solar thermal power for the purpose of environmental clearance.

Major Solar Thermal Technologies

The four most promising solar thermal technologies are parabolic trough, central receiver or solar tower, parabolic dish and Linear Fresnel collectors. The parabolic trough and linear Fresnel technologies have a line focus, whereas other two technologies have a point focus. Typically, concentration ratio for a line focusing technology is in the range of 80 and solar power plants based on these technologies operate at about 400 deg C or below. Comparatively, the conventional thermal plants operate at much higher temperatures than this. The technologies based on the principle of point focus may have higher concentration ratios, and therefore, the higher operating temperatures. Parabolic trough technology has been in commercial space for many years now, and a large number of power plants around the world, especially Spain, are being built based on this technology. Other technology configurations, which are getting attention from the developers, include solar towers, CLFR and dish-Stirling.

Solar Thermal Storage Plants

Solar heat collected during the day can be stored in the form of molten salts or other suitable media. The stored heat is used to generate power during periods of low sunshine or night. World over, about 20 plants have been constructed using thermal storage. This includes 50 MWe Andasol plants in Spain, which are designed with six to eight hours of thermal storage. The capacity utilization factor (CUF) of a solar plant without storage ranges in between 20-23% depending upon availability of solar radiation at the site and the efficiency of the technology selected for conversion of solar energy to heat. The CUF increases for solar plants incorporating thermal storage.

Use of Auxiliary Energy

As per JNNSM guidelines, the solar thermal power plants are allowed to use 10% of the energy generated from the plant for auxiliary energy consumption, while balance of the generated power is to be fed to the grid for availing tariff. However, solar thermal power plants may require some operations to be performed during evening/ night, especially the plants designed to have thermal storage. Some energy will be required for these operations from the grid. The overall requirement of this energy will be only a small fraction (about 1-2%) of the nameplate rating of the plant.

Water Requirements

A typical solar thermal power plant has a cooling cycle, which is similar to that used in conventional thermal plants. The requirement of water on per unit basis is at the similar levels, however, total water requirement on a capacity basis is 60-70% less due to lower capacity utilization factor. These plants, like conventional plants, may be designed to have air-cooled or wet cooled systems, or a combination of the two. A comparative water requirement of thermal power projects based on different technologies is given below.

Technology	Cooling	Litres/MWhr
Coal/ Nuclear	Once-through	87400-102600
	Recirculating	1520 - 2850
	Air cooling	190-250
Natural Gas	Recirculating	760
Solar tower	Recirculating	1900-2800
	Hybrid	340-950
	Air cooling	340
Parabolic trough	Recirculating	3000
	Hybrid	380-1700
	Air cooling	300
Solar Dish/Engine	Mirror washing	76
Linear Fresnel	Recirculating	3800

Reference

Concentrating Solar Power Commercial Application Study: Reducing Water Consumption of Concentrating Solar Power Electricity Generation, Report to Congress, U.S. Department of Energy

Area Requirement

Solar thermal power plant typically requires an area of about 2.0 to 2.5 hectare per MW capacity depending upon plant configuration, site, and thermal storage etc. The land is mainly used for installing solar collectors in an open environment. The built up area for covered construction is approximately 600 square meters for a 100 MW plant, which is required to locate the steam turbine and the control room.

The guidelines for solar thermal power projects under phase 1 of the JNNSM, stipulated 20 MW and 100 MW as the minimum and maximum capacity.

Land Development Activities

The land areas where solar power projects will be located would typically be represented by arid and non-farming land. The land areas that would have severe slopes, natural drainage courses, environmentally sensitive zones, forests and bio-reserves are not suitable for setting up these projects. It is assessed (solareis.anl.gov/documents/dpeis/Solar_DPEIS_Appendix_M.pdf) that overall effect would not be detectable or would be so minor that they would neither destabilize nor noticeably alter any important attribute of the land resource.

The potential construction and operation impact of Solar Thermal Power Plants, as inferred from the literature (<http://www.energy.ca.gov/sitingcases>) is as follows:

Activity	Potential Impact
Pre-construction Phase Site mobilization - Includes installation of fencing, and provision of utilities	This involves minimal ground disturbance and is not expected to impact environment and ecology of the site
Construction Phase This includes grading, boring for pylons and support structures, trenching and other sub-surface soil work at site for access roads and building of project facilities.	The impact of these activities is minimal as the affected site area is very small as compared to total land area. The impact is limited to the construction phase only. The prominent land features are expected to be naturally restored after completion of construction activity.
Operation Phase	The project does not produce any effluents and polluting gases. Water is required for generating steam in a closed cycle and for washing and cleaning of mirrors. Water will be accessed from the sources allocated by the respective State governments and do not involve use of ground water.

Jawaharlal Nehru National Solar Mission

The Government launched the Jawaharlal Nehru National Solar Mission (JNNSM) on 11th January 2010 with an objective to establish India as a global leader in solar energy, by creating policy conditions for its diffusion across the country quickly and achieve a scale to drive down costs to levels required to achieve grid parity by 2022. The targets of the Mission include deployment of 20,000 MW of grid connected solar power by 2022. The Mission will be implemented in three phases.

For the Phase 1 of the Mission, a target of 1,100 MW grid connected solar plants has been set up, which includes 100 MW plants as rooftop and other small solar power plants till March 2013. 704 MW capacity grid connected solar power projects were selected by December, 2010, which comprises of 500 MW solar thermal and 204 MW PV power projects. The remaining capacity will be selected during the year.

Environment Aspects of Solar Power

Solar energy is one of the most abundant sources of clean, renewable energy. Unlike fossil fuel based power generation, solar energy does not have any harmful emissions like CO₂, SO_X, NO_X etc.

The pollutants commonly emitted from fossil fuel power plants—greenhouse gases such as carbon dioxide, among others—are completely absent from the solar thermal power projects. Unlike fossil-fuel power generation, solar thermal power plants do not produce any toxic emissions, such as mercury, smog-forming chemicals and particulate “soot.” Mercury contaminates our water supply and food chain, and can result in health problems, particularly in developing fetuses. Solar thermal power plants do not emit any particulate matter and ozone that damage air quality. A comparison between solar thermal and conventional power plants is as follows:

SI #	Air Quality impact	Thermal power	Combined cycle	ST Power
1	SPM - Suspended Particulate Matter	Yes	No	No
2	RPM - Respirable Particulate Matter	Yes	No	No
3	SO ₂	Yes	No	No
4	Nox	Yes	Yes	No

SI #	Water quality impact	Thermal power	Combined cycle	ST Power
1	Boiler blowdown	Yes	Yes	Low
2	Ash pond effluent	Yes	No	No
3	Cooling water blow-down	Yes	Yes	Low
SI #	Soil quality impact	Thermal power	Combined cycle	ST Power
1	On-site hazardous waste storage	Yes	No	No
2	Ash disposal site	Yes	No	No

International Energy Agency assesses that over a CSP plant's entire life-cycle, it will produce 30 times less carbon dioxide per unit of power produced than a coal-fired power plant and 13 times less than a modern natural gas-fired power plant (www.iea.org/textbase/papers/2002/renewable.pdf).

Proposal

Solar Projects do not fall under the list of projects/ activities requiring prior Environmental Clearance as per the EIA Notification of 2006. However, in a recent development, when large Solar projects have approached the respective State Pollution Control Board for Consent to Establish, they have been classified under category 8 (b) of List of projects as per above notification and instructed to obtain EC.

As per the said notification, category 8 (b) covers Townships and Area Development projects covering an area > 50 ha and/or built up area > 1,50,000 sq. mtrs. All projects under this category further fall under category 'B1' requiring preparation of an EIA report for clearance by the State Environmental Impact Assessment Authority (SEIAA).

As mentioned above, solar thermal technology uses land mainly for putting up solar collectors, which are open to the sky. The built up area for covered construction is very small compared to the threshold limit of 150,000 square meters, even under category 8(b). These plants have minimal O&M requirements and the requirement of operations staff is small. So a large solar plant irrespective of area occupied should not be considered as a township or an area development project.

Considering these facts and the non-polluting and environmental friendly nature of Solar Projects, it is proposed that solar thermal power projects may be exempted from Environmental Clearance requirements.