





## POLICY AND LEGAL RECOMMENDATIONS

# Implementing National Solar Mission in India Need for an effective Legal and Institutional Response



Heinrich Böll Foundation



Enviro Legal Defence Firm (ELDF)

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## IMPLEMENTING NATIONAL SOLAR MISSION IN INDIA

### **Enviro Legal Defence Firm (ELDF)**

108-A, Pocket C; Express View Apartments; NOIDA Expressway;  
(Opp. High Court Judges Colony) ; Sector 105; NOIDA-201301; U.P.; India  
Landline: +91-120-2562108; Telefax: +91-120-2562109 ; Mobile: +91-9810298530

### **Heinrich Böll Foundation**

C-20, 1st floor, Qutub Institutional Area  
Delhi 110016, India  
phone +91-11-2685 4405, +91-11-2651 6695  
fax +91-11-2696 2840  
mail: [axel.harneit-sievers@hbfasia.org](mailto:axel.harneit-sievers@hbfasia.org)  
web: [www.boell-india.org](http://www.boell-india.org)

## SUMMARY OF STUDIES CARRIED OUT UNDER THE PROJECT LEADING TO THE RECOMMENDATIONS

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The above mentioned project 'Implementing National Solar Mission in India' sought to carry out a diagnostic assessment of the National Solar Mission (NSM) from the implementation stand point. The project aimed at demystifying various assumptions under the NSM such as zero environmental impact of solar energy development in India and the concerns regarding solar lighting for poor as the priority sector under the NSM. The project also sought to suggest an integrated institutional planning for solar power generation in rural areas and innovative methods of solar lighting distribution with the involvement of communities and Panchayati Raj Institutions especially in areas of special administration i.e. Scheduled Areas and in special hill contexts such as those of Ladakh. The project specifically focused on the institutional hand-holding required for the delivery of solar power in the rural areas. The unique Constitutional status of most backward

regions in the country and the creative use of Self Rule Law in these regions for development of village energy plans, which otherwise has been left out by the earlier rural electrification schemes such as Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) and Remote Village Electrification Program (RVE) under MNRE has been looked at specifically. Accordingly, comprehensive desk and field based studies were carried out on: a) environmental ramifications of the National Solar Mission; b) to understand the status of implementation of NSM in Ladakh specifically and Jammu and Kashmir generally as well as in the state of Rajasthan and Chhatisgarh and c) a diagnostic assessment of the policy and institutional support required for the effective implementation of the NSM. The findings under the Project and policy interventions required for the smooth implementation of the NSM are summarized below in the form of Recommendations.

## IMPLEMENTING NATIONAL SOLAR MISSION IN INDIA

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### POLICY AND LEGAL RECOMMENDATIONS

#### Finding: **Pollution Aspect of 'Solar India'**

**Environmental Implications of 'Solar India' and the Need to bring amendments in Subject Specific Environmental Laws:** Contrary to the popular assumption under the National Solar Mission that Solar energy has 'zero' environmental impact, the study of various technologies for manufacturing solar cells and solar modules using metallurgical grade silicon and other hazardous material suggests that the manufacture of the cells and modules will amount to the release of toxic effluents and gases such as phosphine which will have wide scale environmental ramifications in the country. Given that the success of the NSM lies in increasing the domestic manufacturing capacity, the manufacturing of solar cells and modules in large quantities is considered the only means to bring down the technology cost and is therefore unavoidable.

#### **Recommendation**

##### **Need for amendments in the environmental regulatory processes and institutional strengthening for implementing the regulation**

The current legislations and environmental regulatory processes do not provide an effective framework for the regulation of solar manufacturing units and are silent on any impact assessment processes such as an Environment Impact Assessment (EIA) for assessing environmental impacts of manufacturing of solar modules, cells to be used in solar panels. Further the effluents and gases released can have varied impacts on the local ecology of the area. For example the environmental impacts of release of toxic effluents and gases in desert ecology would be different from the environment impacts in coastal area. There is thus need for amendments in the EIA Notification of 2009, Coastal Regulation Zone (CRZ) Notification of 2010, amendment in the Consent to Establish (CTE) and Consent to Operate (CTO) mechanism under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981, the Special Economic Zone Act, 2005 and EXIM Policy, 2009. The trans-boundary movement of hazardous raw material for solar manufacturing should also be considered and a clear guideline under Basel Convention, 1992 needs to be provided.

## 2 Finding: Solar Power as the most land intensive electricity generating technology and absence of Land Use Planning

There is a huge requirement of land for solar utilities. As there are already conflicts around land generating equity and resource issues at a national scale, any further acquisition of land is going to complicate issues around land resources. The Solar Power being the most land intensive electricity generation options (5-10 acres/MW), currently, there are no standards in place for land acquisition required for solar manufacturing plants and power stations.

### Recommendation

#### **Need for programmatic Land Use Plan for all solar projects.**

There is a need to frame guidelines to prevent excessive land acquisitions by project developers. Mandatory Land leasing for utility power scale plants is one of the options to provide equitable solutions to the original land owners. There is thus a need for programmatic Land Use Plan for all solar projects.

## 3 Finding: Absence of water regulation regime at the national level and Impact on water resources, absence of siting plan for solar thermal power plants-Increased Pressure on water resources due to the development of Solar Thermal Power Plants, especially in dry and arid areas

Solar thermal technology is successful in areas with high solar radiation. The technology requires large volume of water for cooling down the steam. Much like other conventional power plants, concentrated solar power plants require water for cooling the steam used to power the electric turbine. Thus, as mentioned earlier, these plants must typically be sited close to water sources. In India sun rich areas such as Rajasthan or Gujarat (or cold desert of Ladakh) are already short of water resources. Therefore there is a need for revisiting the solar resource mapping and identify sites in close proximity to a large water source - for cooling the steam that is produced in the plant<sup>1</sup>. This is especially true as India lacks an umbrella legal framework to regulate the uptake and conservation of freshwater at the national level due to the constitutional allocations of subjects where water is within the jurisdictional competence of the state.

### Recommendation

#### **CSP plants need to be sited in coastal regions or close to rivers**

Since, water is largely regulated by states, which have enacted a variety of regulations on water use<sup>2</sup>. MNRE cannot rely on a national framework to ensure that the JNNSM promotes sustainable water use. Instead, it must encourage a thorough review of water use incorporated in the environmental impact assessment process to achieve this goal.

The impact of CSP plants on coastal, delta or riverbank land and their ecosystems must not be overlooked, and must be considered in a thorough environmental impact assessment process for these projects. There is a need for laying down normative water use standards for solar power plants. Solar parks should be developed in high solar resource locations where water availability is adequate.

<sup>1</sup> This is not the case for Solar PV plants, which would only use water to wash mirrors.

<sup>2</sup> International Environmental Law Research Centre, *Water Law in India, Overview of Existing Framework and Proposed Reforms*, at 4, available at <http://www.ielrc.org/content/w0701.pdf>

#### **4 Finding: Energy intensiveness of Solar Manufacturing units**

An average solar manufacturing unit requires a large scale thermal boiler and vast amount of conventional power.

##### **Recommendation**

##### **Need for declaring Solar Manufacturing Units as Red Category Industry**

Due to energy intensiveness of solar equipment manufacturing and reliance on conventional power there is a need for declaring solar manufacturing units as red category industry.

#### **5 Finding: Missing Guidelines for Prior informed consent for import of hazardous raw material, equipments under the Basel Convention, 1992**

Not all the raw material used for large scale solar power manufacturing is available in India. Certain substances that are hazardous in nature may have to be imported in large quantities. India being signatory to Basel Convention 1992, the importer is required to take prior permission of the Central Government for importing any substance listed under Schedule-III of the Hazardous Waste Rules, ( HWR) 2008 issued under the Environment Protection Act, 1986. The current regulatory framework provided under the JNNSM or under various policies by the MNRE is silent on this aspect.

##### **Recommendation**

There is a need to implement HWR, 2008 in conformity with India's obligations under the Basel Convention, 1992.

#### **6 Finding: Missing regulatory framework for Health and occupational safety of workers employed in the Solar manufacturing units**

The key legislation on occupational safety being the Factory Act, 1948, defines "Hazardous Processes" as an activity in relation to an industry specified to the First Schedule under the Act. The First Schedule to the Act lists number of Industries that are hazardous. It is difficult to ascertain as to under which category solar manufacturing units would fall under. As seen, the SPV technology uses metallurgical grade Silicon and number of other hazardous chemicals, but the same is not taken care of under the Factories Act. Further the states have been given the power to amend or make variations the list of industries specified in the Schedule.

##### **Recommendation**

There is a need for ascertaining norms for health and occupational safety of workers at solar manufacturing units. There is also a need to bring amendments in the state specific Factory Rules under the Factories Act, 1948.

## 7 Finding: Missing regulatory framework for the Protection of Fragile Ecosystems-Need to protect desert fragile ecosystems from Concentrated Solar Thermal Plants

At concentrated solar power plants, birds have been threatened by the rays of focused sunlight produced, particularly in "power-tower" plants. At solar PV plants, the shiny surfaces of solar panels, which resemble water surfaces, have in some cases resulted in aquatic insects such as mayflies depositing their eggs on the panel, which means that these solar panels may pose a false habitat hazard to more than 300 species of insects. Depending on where the plant is sited, this effect could have many subsequent cascading effects on local food chains and the fitness of local insect species<sup>3,4</sup>.

### Recommendation

The planning of any large scale desert power facility must therefore include a conservation plan that would anticipate and mitigate the damage done to any plant and animal species in the area based on the technology employed and siting of the plant.

## 8 Finding: Missing regulatory regime for the regulation of Solar Thermal Power Plants in the sensitive Coastal Regulation Zone

Under the CRZ Notification 2011 thermal power plants are permitted<sup>5</sup>. It is unclear, however, whether solar thermal plants are included under thermal power plants mentioned as permissible activity under the CRZ Notification.

### Recommendation

Since facilities to generate power from non-conventional energy sources are allowed in CRZ II, III and IV, it is important that these facilities are thoroughly reviewed not just for water resource impact (discussed above), but also for their land use and coastal ecology impact. It is also not clear whether the existing SEZs which are in the CRZ-I areas would be permitted to manufacture solar panels.

<sup>3</sup> Available at: <http://www.alternative-energy-news.info/solar-panels-threat-to-biodiversity/>

<sup>4</sup> Discovery News, Solar Panels Lure, Kill Insects, June 7, 2010, available at:

<http://news.discovery.com/animals/solar-panels-insects.html>

<sup>5</sup> 3(2)(iii) of the CRZ, The New Pre-Draft CRZ Notification of 2010 also permits utilities requiring foreshores facilities

## 9 Finding: Exemption from Environment Clearance for setting up of Solar Photo Voltaic and Solar Thermal Plants especially in the Coastal Regulation Zone

Currently, setting up of solar power plant of any scale does not require environment clearance under the Environment Impact Notification (EIA), 2006. Environment impact of solar manufacturing units is well known today. However, there is no significant study that has been carried out to understand the environment impact of setting up a solar generation facility and its impact during its operation. In the fragile ecosystems such as coasts, the setting up of solar facilities may have serious ramifications not only due to the area occupied in the coastal regulation zone which is rich in marine biodiversity but also creation of "heat zones" that are a result of solar radiation emitted from the surface of panels after the day. It's a phenomenon very similar to heat radiation emission from buildings and rocks after they have stopped absorbing heat from the sun during evening hours. Clearly, there is a need to carry out a scientific assessment of such an impact which is important from the conservation of marine diversity standpoint.

### Recommendation

MNRE and MoEF should come up with Guidelines to developers that any plant to be set up in the Coastal Regulation Zone should carry out a detailed study on the potential impact of such a commissioning on the local ecology of the area and shall obtain a certificate from the State Coastal Zone Management Authority showing that the developer has carried out a study and as per the study the state government is aware of the ecological impact/no impact that the solar facility may cause in coastal zone.

## 10 Finding: Missing the requirement of Forest Clearance for Solar energy development in the forest areas

The impacts on existing forest ecosystems due to installation of solar panel on forest land are not known today. There is no study to assess the impact of installation of solar panels on large tract of forest land impact on the soil and sub soil biodiversity if direct sun light does not reach the ground.

### Recommendation

There should be mandatory requirement of Forest Clearance for the installation of solar panels under the Forest Conservation Act, (FCA) 1980. Provisions for payment of Net Present Value (NPV) should be provided to solar energy generation plants if forest land is required for the commissioning of the plant as has been done in case of wind energy projects<sup>6</sup>. This however needs to be distinguished in terms of scale and not treated co terminally with known hazardous practices on forest land such as mining.

<sup>6</sup> Wind energy projects require payment of Fifty percent of the NPV at the minimum rate, provided no tree felling is involved at the time of installation

### **Finding: Policy aspects related to the existing definition of Electrified Village and home lighting systems under NSM**

In the existing definition of Electrified Village as per the O.M. No.42/1/2001-D (RE) dated 5th February 2004 by the Ministry of Power and followed subsequently in Electricity Policy of 2005 and Rural Electrification Policy of 2006, one of the criteria to consider a village electrified is that the number of households electrified should be at least 10% of the total households in the village. With the ongoing efforts under NSM if home lighting systems are able to illuminate 10% houses in a village where the grid has not reached and there is no alternative source of lighting and meeting energy needs of the village, will the village be considered electrified. Further as per the RGGVY, the solar lighting systems are stop gap arrangements till more effective solutions are worked out by extending grid to these villages and all the RE generation plants in the villages have to produce grid quality electricity so that when the grid reaches these villages, the generation can be fed into the grid. Also, important is to understand the success of the RVE Scheme of the MNRE and whether lighting systems and RE generation plants installed under RVE by the Rural Electrification Corporation have been able to match the criteria for the rural electrification as per the O.M. of 2004.

#### **Recommendation**

It is viewed that in the areas where grid extension is not always either economically feasible and environmentally sustainable such as villages inside national parks, wildlife sanctuaries, tiger reserves, ecologically sensitive areas, highly sensitive coastal areas and island areas and if there is ample solar radiation, the attempt should be to install solar generation plants of the capacity that its able to provide electricity for a substantial number of hours so as to meet the village energy requirements. Thus there is a clear need for enhancing the rural electrification component of NSM wherever there is potential for solar energy. The effort under NSM should be to support installation of kw capacity village level solar energy plants so as to minimize the need for the grid and provide reliable clean energy to the villages. Efforts should also be made that these plants are run and managed by the community.

### **Finding: Solar power for the rural poor as priority under the NSM and actual targets for rural electrification being contrary to the objectives**

From the objectives of the NSM it is made out that the Mission aims to fulfill the basic need of lighting in the villages on a priority basis. However, a closer look at the cumulative targets suggests that the grid connected solar power generation forms major portion of the NSM (20 GW) while off-grid constitutes on 2 GW. While it can always be argued that grid-connected solar power generation can also reach the poor as the surplus grid connected power can be used to electrify villages that have not got the electricity as yet.

#### **Recommendation**

Considering that the overall objective of the NSM is governed by the objectives of the National Action Plan on Climate Change which aims to reduce the carbon emissions substantially, extending grid to remote areas would mean extending mix of clean and conventional (coal) energy to these areas with the additional cost of grid extension and T&D losses. Therefore it is recommended that the off grid component of the NSM should be increased and not only the distribution of solar lanterns but much improved home lighting systems and community owned village scale solar generation plants should be installed.

### 13 Finding: Number of lanterns and home lighting systems to be distributed under NSM is far less than required

Under NSM 20 million solar lanterns have to be distributed by 2022. Apparently, these lanterns are distributed under the Public Distributed System (PDS). There are two issues related to the distribution of solar lanterns. First, the number of lanterns to be distributed is far less than the requirement of 72 millions households that use kerosene today<sup>7</sup>. Second is the problem with the distribution system itself, considering specially that a target of distribution of 4,250 systems everyday till 2022.

#### Recommendation

It is recommended that distribution of solar lanterns should be routed through Panchayat Raj and grass root level Institutions which does not seem to be the case in the current implementation pattern of the NSM. In the special areas of governance such as Scheduled Areas where Gram Sabha has the special powers to prioritize village developmental needs and formulate the plans accordingly.

### 14 Finding: Grid quality solar power generation in rural areas and difference in the approach to rural electrification between the two major programs having the same objective

RGGVY is the umbrella program for rural electrification which has been extended for the current five year plan. RGGVY further stipulates that wherever grid connection is not feasible or not cost-effective, the village will be provided stand-alone solar or hybrid systems under RVE of the MNRE. Its no where made out clear that whether RE solutions under RVE would be carried in a way that grid connection is not required. What is more crucial under RGGVY is its emphasis that "*all infrastructures must be grid-compatible in order to ensure that when a village is ultimately connected to the grid and prior investments are not lost*". Meaning thereby that RGGVY presupposes that renewable energy solutions are only interim solutions and grid connectivity is the only means for reliable power supply even in rural households whose energy requirement is much less as compared to the urban. At the same time, NSM looks at village electrification differently and its focus is to reduce the cost of grid extension and conventional use of energy in the areas where grid has not reached so far.

#### Recommendation

With the objectives of the NAPCC in mind, the Rural Electric Corporation (REC) should attempt to clearly identify the areas under RVE where grid cannot reach due to technical or economic reasons. Renewable energy solutions under RVE in the remote villages where grid can not reach should not be looked as stop gap arrangements and it should not be thought that grid quality electricity is the only reliable form of energy. With the improvements in technology and with the choice of the right technology suiting the Sun energy potential of a particular region (as per the solar resource mapping), the attempt should be to provide Solar Energy systems of a community or village scale so that there is no requirement of the grid.

<sup>7</sup> Survey by the National Sample Survey Organization on the Household Consumer Expenditure in India (2007)

## 15 Finding: Contingent Subsidy and Least portion of subsidy for the rural poor

From the Mission Document it is understood that the GoI has already committed to three major aspects of the NSM in the First Phase: capital subsidy for the 1,100 MW grid-connected solar plants, the Special Incentive Package Scheme (SIPS) for PV manufacturing units, and some form of capital and interest subsidy for solar home lighting systems and off-grid solar applications. Within this the first two aspects have definite portion of subsidies.

**Contingent subsidy:** The home lighting systems meant for the poor are contingent on the subsidy to be made definite in future contingent upon the performance in the first phase and possible subsidy under a potential climate deal.

### **Least portion of the subsidy for the rural poor in the First Phase:**

The NSM proposes to provide solar lighting systems under the ongoing remote village electrification program of the MNRE to cover about 10,000 villages and hamlets. Taking a conservatively high average number of 100-200 households per village, 1-2 million systems would be required. Assuming an 18 W system at Rs 6,000 per system and that all systems will be provided 90% capital subsidy for being distributed in remote settlements, the total subsidy amounts to Rs 500 and 1,000 crore. It is also understood that the rest of the solar lighting systems will be dissipated through market mechanisms and provided interest subsidy in the form of low interest loans. A sum total of analysis above shows that only 7% of the committed subsidy is for rural and poor as against the priority objectives mentioned in the NSM. (Prayas Energy Group).

### **Recommendation**

The subsidy under the Mission for rural poor must be revisited by the Mission Steering Committee. Instead of contingent subsidies, the portion of subsidy for the rural and poor population must be ascertained.