

**NEED FOR INTEGRATED POLICY AND INSTITUTIONAL FRAMEWORK FOR
THE IMPLEMENTATION OF JAWAHARLAL NEHRU NATIONAL SOLAR
MISSION IN RURAL AREAS**

**Using unique Constitutional Position of tribal areas in the country for rural
electrification under NSM**



(Using sunlight in the night, a tribal village in Chhattisgarh)



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1. REVISITING THE NATIONAL SOLAR MISSION

The National Solar Mission (NSM) is on its way, chasing the targets set forth for the first phase which ends in March 2013. Implementation of the Mission's objectives in its current phase has thrown up number of important issues, particularly related to finance and availability of land in certain states for grid connected large solar plants. Under the Off-Grid component of the NSM, several issues are likely to surface such as management of small scale solar plant and the technical capacity at the local level. The distribution of solar lanterns and home lighting systems is also likely to face challenges as the required coordination between line agencies such as State Nodal Agencies and Public Distribution Agencies is missing. SNAs do not maintain a data of BPL households. At the same time states have classified BPL population of the state in to various categories such as *Garib* (poor) and *Ati-Garib* (very poor) and *Ant-avastha* (*poor in the last stages of life so most deserving*). The Guidelines for the distribution of home lighting systems are not aware of these categories and there might be a conflict as to which category of poor the system should reach as the number of lanterns and lighting systems to be distributed is one sixth of the total number of estimated poor population in the Country¹. Besides, there are also instructions at the state level where every girl child in a BPL household has to be provided a solar lantern so that she can study. These guidelines are under state Education Schemes. The convergence of these guidelines has not been thought about either at the state level or at the national level.

There are other issues relating to capacity of Zila Parishads (District Municipal Corporations) and other line agencies such as Public Works Departments to carry out an assessment of all buildings in the district and come up with a master plan for the installation of Solar Roof Top which is a pre-requisite for availing Central Financial Assistance for solar cities. Further, issues relating to environmental impact of solar energy development, effective regulatory regime and institutional strengthening also need attention².

In this context, it is important to revisit the NSM's objectives with a special focus on its implementation design and in the context of rural electrification.

¹ See Deshmukh et al, Economic and Political Weekly, March 20, 2010

² See, POLICY BRIEF Making an environmentally sensitive and socially equitable Solar Energy Development in India; at <http://www.boell-india.org/web/113-775.html>

2. ANALYSIS OF TWO BROAD COMPONENTS UNDER THE NSM-

Broadly, the National Solar Mission (NSM) has two components: Grid connected solar power generation and off-grid solar energy development. Grid Connected Solar includes a vision for grid connected solar roof-top with a aim to produce 100 MW. Off-grid component includes small utility scale power plants to be installed in villages. Solar Lighting systems comprise of small systems having two panels with a battery and solar lanterns. Solar lanterns have to be distributed with 100% subsidy (free of cost) to the individuals and families below poverty line³. These two broad components with subcomponents together aim to feed 22 GW of solar power in the country's coal dominated power sector by 2022.

2.1 Rural electrification using solar lighting and off-grid solar systems as priority under NSM- *Is it an illusion?*

Though in the Mission's objectives, meeting the lighting and other livelihood energy needs of India's poor population *that has no access to electricity appears as one of the priority sector under the JNNSM, however, the analysis of the targets from grid connected and off-grid allocation for the two components shows that out of 22 GW only 2 GW of solar energy is to be procured from off-grid solar systems and the rest will be harnessed from grid connected large solar plants at a costlier price of Rs 15.5 and Rs 17.9 per kwh from solar thermal and Solar Photo Voltaic (referred to as 'SPV') respectively as determined by the (Full form and then acronyms) Central electricity Regulatory Commission (referred to as 'CERC')⁴. Further, an assessment of total subsidy available for various objectives and activities throughout the life of the NSM shows that only 7% of the committed subsidy is for rural and poor⁵.*



Given that the number of un-electrified villages has increased much more after the definition of electrified village was revised in 2004 under the Rural Electrification Policy

3 See Mission's Objectives and targets at <http://mnre.gov.in/pdf/mission-document-JNNSM.pdf>

4 CERC Commission (Terms and conditions for tariff determination from renewable energy sources) (First Amendment) Regulations, 2010 released on 26 February 2010, available at http://cercind.gov.in/2010/ORDER/February2010/53-2010_Suo-Motu_RE_Tariff_Order_FY2010-11.pdf.

5 Deshmukh et al, EPW, March 20, 2010

(discussed in detail in the next section), the NSM should have dedicated more allocation to the off-grid component to cover substantial number of un-electrified villages. As regards the distribution of solar lanterns and home lighting systems, the NSM component is continued under the ongoing Remote Village electrification Program of MNRE which covers 10000 villages left out under Rajiv Gandhi Gramin Vidyutikaran Yojna. The Program clearly does not touch upon the number of villages which have come out of from the electrified village category under the modified definition of electrified village. Furthermore, under the JNNSM rural electrification with small of grid solar plants is also dependent upon foreign funding under climate finance policies and possible deals under United Nation Framework Convention on Climate Change. This contingent nature of funding which is expected under climate negotiations and role of the developed nations that they may play in future in providing financial assistance to developing countries puts the development of solar energy in rural areas in a situation of uncertainty. There should have been a well thought out financial assistance for off-grid solar energy development throughout the life of the NSM and beyond as in the case of Grid Connected solar and Rooftop PV development where Central Financial Assistance is provided to all projects. It is thus important to understand the Grid Connected component under the NSM in some detail.

2.2 Understanding Grid Connected large scale solar plants under the JNNSM- An institutional perspective

For the large scale grid-connected solar electricity, which forms largest component (20 GW) out of 22GW, the NSM relies on the development of indigenous solar technologies which will significantly lower the solar power generation cost and minimize cost to consumers. It is worth noting that Department of Information Technology under the Ministry of Communications and Information Technology, Government of India has been made the nodal agency for providing capital subsidy and in principle clearance to the solar manufacturing units. While the need for a National Renewable Energy Technology Commission is well established, the institutional mechanism for granting clearance for the solar manufacturing ought to have included other line agencies such as Ministry of New and Renewable Energy itself and the Ministry of Environment and Forest due to the environmental implications of solar manufacturing⁶.

⁶ See Shawahiq Siddiqui et al, POLICY BRIEF Making an environmentally sensitive and socially equitable Solar Energy Development in India; at <http://www.boell-india.org/web/113-775.html>



Another important aspect with reference to the grid-scale solar power is the fixing of feed-in tariff by the CERC. As per the National Tariff Policy, 2006, the State Electricity Regulatory Commissions (SERCs) were to be given the opportunity to decide state specific feed-in tariff. However with NTPC Vidyut Vyapar Nigam Ltd. (NVVN)⁷ entering into the picture to implement the incentive mechanism envisaged within JNNSM of ‘bundling’⁸ solar power with conventional power from the unallocated quota of the central government. , the tariff rate would be same for all the states. This seems to be unjustified considering the fact that all states are not equally placed for the development of solar energy. There was an overwhelming response by the developers for the phase –I development of solar plants (both SPV and Solar thermal) prompting scrapping of the feed-in-tariff set by CERC and replacing it with a reverse bidding mechanism for tariff fixation where solar projects were awarded to the lowest bidder regardless of their previous experience in developing such projects. This led to aggressive bidding lowering the tariff for the solar projects upto Rs 12-14 per kwh as against CERC tariff of Rs. 15.5 and Rs 17.9 per kwh. The effect of this bidding process on the financial viability of the project would be revealed when MNRE comes out with the data on the projects that have achieved financial closure⁹ and the projects cancelled on account of the failure to meet the deadline. The uncertainty created by the entire bidding process is not encouraging for developers as such a scenario was not envisaged under the guidelines for selection of grid connected solar projects.

⁷ A wholly owned subsidiary company of NTPC engaged in the business of trading of power

⁸ An incentive option where solar power to be bundled with power out of the cheaper unallocated quota of Central stations and selling this bundled power to state distribution utilities at the CERC regulated price. This is done to bring down the gap between average cost of power and sale price of power. For the purpose of bundling, power has to be purchased by an entity and re-sold to the state power distribution utilities and this function is undertaken by NVVN . NVVN is the designated nodal agency by the Ministry of Power (MoP) for entering into a Power Purchase Agreement (PPA) with Solar Power Developers to purchase solar power fed to 33 KV and above grid, in accordance with the tariff and PPA duration as fixed by the Central Electricity Regulatory Commission. The Ministry of Power then would allocate to NVVN, equivalent mega watt capacity, from the Central unallocated quota, from NTPC power stations, at the rate notified by the CERC for bundling together with solar power. NVVN will undertake the sale of the bundled power to State utilities at the rates determined as per CERC regulations.

⁹ The deadline for financial closure for grid connected solar projects (both SPV and solar thermal) was 09.07.2011

JNNSM stipulates ‘bundling of power’ as an incentive mechanism where NVVN is the entity to purchase solar power generated by the solar plant developer as per Power Purchase Agreement (‘PPA’) executed by NVVN with the solar plant developer. This arrangement facilitates the solar plant developer (connected to the grid) by ensuring a ready purchaser for the generated solar power. Further, MNRE has evolved a ‘payment security scheme’¹⁰ as a fall back option in the eventuality of distribution entities not paying for the bundled power supplied by NVVN. The scheme envisages setting up of a ‘Solar payment security account’ as a payment risk mitigation strategy. The distribution utilities are required to open a letter of credit (LC) for 6 months for payment of the bundled power. In case of default in payment to NVVN it can en-cash the LC which is backed by an escrow account. In addition NVVN has the option of diverting and selling bundled power in the short term market. In case of amount realized by sale of bundled power in short term market is lower than the cost of bundled power, the difference is to be paid from the ‘Solar payment security account’. As the grid connected component of the NSM is fairly clear at least till the First Phase where NVVN is playing the central role after the fixation of tariff by the CERC and MNRE providing clarity on the financing of the first phase of JNNSM I think we need to be more detailed here) it is the off-grid component of the NSM which is the focus of this study. A key component of NSM is the off-grid applications for meeting rural energy needs. The NSM describes it as “*A key opportunity for solar power lies in decentralized and off-grid applications. In remote and far-flung areas where grid penetration is neither feasible nor cost effective, solar energy applications are cost-effective. They ensure that people with no access, currently, to light and power, move directly to solar, leap-frogging the fossil fuel trajectory of growth.*”

3.0 VILLAGE ENERGY SELF SUFFICIENCY AND NSM’S APPROACH TO RURAL ELECTRIFICATION

NSM’s approach to rural electrification is that it aims to fulfill the basic need of lighting in the villages on a priority basis. This is highlighted in NSM where it attempts to “*provide solar lighting systems under the ongoing remote village electrification programme of MNRE to cover about 10,000 villages and hamlets. The use of solar lights for lighting purposes would be promoted in settlements without access to grid electricity and since most of these settlements are remote tribal settlements, 90% subsidy is provided. The subsidy and the demand so generated would be leveraged to achieve indigenization as well as lowering of prices through the scale effect. For other villages which are connected to grid, solar lights would be promoted through market mode by enabling banks to offer low cost credit.* But a closer look at the target suggests that the NSM only targets distribution of 20 million solar lighting systems by 2022. It is critical to comment that this is far less than the number of households that use kerosene for lighting purposes (72 million) today¹¹, it is also a concern as to how the distribution of 20 million solar lantern is going to take place as the number translates to a target of distribution of 4, 250 systems everyday till 2022.

The current institutional mechanism under the ‘solar lantern program’ of MNRE has the state nodal agencies and akshay urja shops as the implementing agencies. MNRE provides subsidy of Rs 2400/ per lantern and also Rs.100 as service charges for maintenance of solar lantern. There are no assigned targets for the implementing agencies for the distribution of

¹⁰Circular No.29/5/2010-11/JNNSM(ST) dated 30.06.2011 issued by MNRE

¹¹ Survey by the National Sample Survey Organization on the Household Consumer Expenditure in India (2007)

solar lantern. Further, girl child belonging to BPL family has to be provided solar lantern free of cost and here the district administration comes into the picture for verifying the BPL status of the family. In this sense it is a daunting task given the manpower shortage faced by SNAs and nearly non-existent *Akshay Urja* shops at the district level. While the need for distribution of solar lantern is well understood, the NSM should have targeted for a wider approach to rural electrification than mere distribution of lighting systems. A model based on community owned small size (KW capacity) solar off grid lighting systems would have been a better idea. One such example is the community based plant in Durbuk Block in Ladakh in the state of Jammu and Kashmir which is explained in detail in the subsequent section.



Having looked at the NSM's off-grid component for rural electrification which does not generate confidence for rural electrification, it would be useful to look at other policy and instruments on decentralization and welfare of rural and marginalized communities that have provisions for promoting clean energy. It would be useful to analyze as to how these instruments can be put to use not in isolation but in integration with the off-grid component of the NSM. What is important to understand is the potential synergy that can be found between different subject matter laws on rural development that may help to implement the NSM effectively in rural areas.

4.0 RURAL ELECTIFICATION IN INDIA- A journey from One Light bulb in the revenue village to distribution of lighting systems for limited households under NSM-

4.1 Examining the Policy approaches for the development of Rural Electrification Programs in India

Before the coming of Electricity Act, 2003 and few measures taken by the Ministry of Power for Power Sector Reforms, rural electrification has found very limited limited place in the national policy and planning for the power development in India. After the coming of the Electricity Act various reforms were brought which helped to improve the rural electrification scenario in India. These are examined below with the perspective that after the coming of NSM, the scenario should improve as the NSM is viewed as an aid to the already ongoing reforms brought under the rural electrification by MoP. Some of the significant steps undertaken by Mop under Power Sector Reforms are summarized below.

4.2 Electrified Village till 2004: One light bulb in a village!

It's noteworthy that until 1997, a village was considered electrified if electricity was being used within its revenue area for any purpose whatsoever. In 1997 a new definition was adopted whereby "A village will be deemed to be electrified if electricity is used in the inhabited locality within the revenue boundary of the village for any purpose whatsoever". Under this definition, in March 2004 a total of 74% of inhabited villages were considered electrified, whereas only 44% of the 138 million rural households (60.2 million) used electricity as a source of lighting. However, according to this definition, if only one light bulb was kept lit for a nightly hour in the centre of a village or one irrigation pump was powered, the whole village was considered electrified.



4.3 Post 2004 and post Electricity Act, 2003-Electrified: *Basic Infrastructure and 10% Household in a village*

Realizing this inadequacy and the statistical bias that came with it, the Government of India changed the definition for rural electrification in March 2004. As per the current definition of electrified village by the by the Ministry of Power, a village is considered electrified when the following criteria are satisfied:

- The basic infrastructure (such as distribution transformer and/or distribution lines) is made available in the inhabited locality within the revenue boundary of the village, including available power supply on demand at at least one hamlet/Dalit Basti as applicable, and any of the public places like schools, Panchayat Office (village council), health centers, dispensaries, community centers etc.; and
- The number of households electrified should be at least 10% of the total households in the village.”

As a consequence of this new definition for electrification, many villages that were previously considered electrified fell by definition into the un-electrified category¹²

¹² Change in the definition of Electrified Village by O.M. No.42/1/2001-D(RE) dated 5th February 2004 , Ministry of Power, Government of India

5. MAJOR POLICIES ON RURAL ELECTRIFICATION IN THE COUNTRY- *Do The Ongoing Rural Electrification Policies Provide Support to the NSM's rural electrification component?*

Prior to the coming of Electricity Act, there have been number of institutional and regulatory reforms in the power sector. These reforms have ranged from unbundling of the State Electricity Boards (SEBs), increased involvement of the private sector in generation, transmission and distribution, to establishment of state regulatory commissions for (do you mean more liberal?) setting of electricity tariffs¹³ based on revenue requirement for operation and maintenance. These reforms have led to improvement in the overall electricity scenario, though these were scattered attempts which were consolidated under the Electricity Act, 2003. Needless to say, these reforms have led to furthering electrification efforts in rural areas¹⁴. The Electricity Act of 2003 followed. It is currently the major piece of legislation covering generation, transmission and distribution of electricity in India which compels utilities to supply electricity to all including in rural areas. Moreover, the National Electrification Policy (NEP) of 2005 which states that the key objective of the power sector is to supply electricity to all areas, including rural areas, the Rural Electrification Policy of 2006 which contains provision of electricity to all households by 2009, quality and reliable power at reasonable rates and minimum lifeline consumption of 1 kWh per household per day as a merit good by 2012 and the National Tariff Policy of 2006, are all policies that aims at encouraging electrification efforts in rural India.

These policies have improved the financial and institutional status of the state utilities, and of the state-level generation, transmission and distribution utilities. They have widened the state governments' scope of action in rural electrification efforts. As a result of the power sector reform process, most state utilities have been unbundled and split into separate entities for generation, transmission and distribution of power. Earlier, there were several bottlenecks in the power sector in the form huge transmission and distribution losses, the performance of state electricity boards had deteriorated on account of various factors like the power to fix tariffs was entrusted with them but they were not able to take decisions in an independent manner and tariff determination was being done by state government keeping in mind political considerations which made the SEBs financially unviable

Clearly, the existing policies unequivocally extend support for the rural electrification in the country. The NSM needs to use various provisions under different policies and increase the scope of its solar lighting and off-grid solar power generation in a significant manner. Currently, the off-grid component of the NSM is primarily focused on installation of utility scale plants which is delinked from the rural electrification policies under the Electricity Act.

¹³ (Asian Development Bank, 2008).

¹⁴ The "Power for All by 2012" initiative was launched by the central government in 2001. The objectives of the programme are to ensure "sufficient power to achieve a GDP growth rate of 8%, reliable and quality power, optimum power costs, commercial viability of the power industry as well as power for all" (Ministry of Power, 2009c)

6. FLAGSHIP PROGRAMS ON RURAL ELECTRIFICATION DO NOT SEE ROLE OF MINISTRY OF RURAL DEVELOPMENT: - *Need for Convergence of NSM with Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)*

6.1 The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)-major driver for rural electrification in the country does not mention of the role of MoRD

The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), since 2005 has attempted a large scale electrification effort in the rural areas in the country¹⁵.

Salient Features of Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)

- The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) was launched in April-05 by merging all ongoing schemes by the Ministry of Power (MoP). It is a programme of rural electricity infrastructure and household electrification for the attainment of national common minimum goals of providing electricity to all households.
- Under RGGVY a total of 35,8010 villages have been electrified as on 30.06.2011. (<http://rggvy.gov.in/rggvy/rggvyportal/index.html>)
- Under the programme 90% grant is provided by Govt. of India and 10% as loan by REC to the State Governments.
- Rural Electrification Corporation Ltd(REC) is the nodal agency for the implementation of the programme. The district-wise DPRs (Detailed Project Report) are prepared by concerned DISCOM, Power Department, State Electricity Board or Central Public Sector Utility (NESCL, POWERGRID, NHPC or DVC) as the case may be and submitted to REC. After scrutiny and appraisal the same is placed before the Monitoring Committee at Ministry of Power for consideration and approval of the project.
- The RGGVY aims at (i) electrifying all villages and habitations as per new definition, (ii) providing access to electricity to all rural households, (iii) providing electricity Connection to Below Poverty Line (BPL) families free of charge.
- The infrastructure sought to be created under RGGVY is providing (i) Rural Electricity Distribution Backbone (REDB) with 33/11 KV (or 66/11 KV) sub-station of adequate capacity in blocks where these do not exist, (ii) Village Electrification Infrastructure (VEI) with provision of distribution transformer of appropriate capacity in villages/habitations (iii) decentralized Distributed Generation (DDG) Systems based on conventional & non conventional energy sources where grid supply is not feasible or cost-effective.

The program is implemented by

- (i) State Power Distribution Companies
- (ii) State Electricity Boards
- (iii) Government Power Department
- (iv) Central Power Sector Utilities
- (v) Co-Operative Societies

The RGGVY as the flagship program of government of India with its *motu* “Power for all by 2012” is a major program of grid extension and reinforcement of the rural electricity infrastructure. Considering the slow progress under the RGGVY wherein as per the 2010 Power Report¹⁶, the Scheme could not complete the targets of 2007-2009, certain

¹⁵ The RGVVY aims at:

- “Provision of electricity access to all households (including rural households) by year 2009 (which includes 23.4 million households living below the poverty line);
- Quality and reliable power supply at reasonable rates; and
- Minimum lifeline consumption of 1 kWh per household per day as a merit good by year 2012.” (Ministry of Power, 2008)

¹⁶ Powermin.nic.in/report/2010

additional conditions were put by the Ministry of Power wherein state governments were made accountable for effective power delivery, fixing of reasonable rates for rural areas, developing franchise establishment of quality monitoring mechanisms and development of state electricity policy and plans. As a result of these conditions, currently, as per the RGGY mandate, a state government is:

- accountable to the Rural Electrification Corporation for the supply of the power in rural areas and include 6 to 8 hours of mandatory power supply to rural areas;
- Accountable for quality and reliable power supply at reasonable rates;
- deployment of franchisees is mandatory for the management of rural distribution;
- states to establish three-tier Quality Monitoring Mechanism to ensure quality of materials and implementation;
- And **States** are to notify their rural electrification plans to the Rural Electrification Corporation (REC)⁴⁰ within six months.

What is important to note is that RGGVY includes a very strong component on non conventional energy development and aims at the development of renewable energy for the villages and hamlets where grid supply is not feasible or cost-effective. Furthermore under the current plan (11th Five Year Plan) it has been projected that RGGVY will be able to electrify 100000 villages and will be able to provide free connections to households below the poverty line¹⁷.

6.2 NSM Rural electrification component and the ongoing efforts under RGGVY- *Are there spaces for convergence?*

The crucial aspect with respect to the NSM's solar lighting and off-grid solar systems which need to be understood in the light of ongoing efforts under RGGVY is the identification of targets without overlapping and a clear road map for the implementation of both the schemes viz the RGGVY and off-grid solar policy under the NSM. As NSM intends to carry out its off-grid component under MNREs remote village electrification program, and aims to cover only 10000 hamlets (approx 2 million systems), it is crucial that these systems are distributed where RGGVY has not been able to benefit and if the grid extension could be avoided due to cost factors. There is thus a need that RGGVY and Remote Village electrification Scheme of the MNRE be merged to not only provide solar lighting systems but good quality home lighting systems that may reduce the burden of extension of grid.

¹⁷Review carried by the Ministry of Power , 2010, mop.nic.gov



Grid compatibility of Solar Energy Systems in rural areas- *Difference in the approach to rural electrification between the two major programs having the same objective*

Under the RGGVY wherever grid connection is not feasible or not cost-effective, stand-alone solar or hybrid systems are being deployed. What is crucial under this Yojna (Scheme) 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. *Whereas NSM looks at village electrification differently and its focus is reduce the cost of grid extension and conventional use of energy in the areas where grid has not reached so far. If the RGGVY under MOP views that solar energy home lighting systems are only a stop gap, then the entire objective of the NSM with respect to the carbon reduction and replace conventional power may get defeated.*

6.3 Coverage for Below Poverty Line families under RGGVY and Coverage for identified poor population under NSM

The past as well as future projections under RGGVY demonstrate that the program has undertaken a significant portion of not only village electrification under its ambit but also electrification for households under BPL. After approving the continuation of RGGVY in the 11th plan, in September 2009, the MoP had sanctioned 332 projects for the period covering the electrification of 49736 un-electrified villages, the intensive electrification of 2,42439 already electrified villages and free electricity connections to 16.2 million BPL households. During the 11th Five-Year Plan, focus is on states that have a heavy backlog of un-electrified villages and BPL households, as well as on special category states (such as north-eastern states, Himachal, J & K and Uttarakhand), and border districts. The table below indicates the projections of the RGGVY for the 11th Five Year Plan.

Table 1: Overall status of the progress of project implementation under the RGGVY at 01/09/09

Proposals	Projects	Project outlay	Project outlay (billion)	No. of un-electrified villages	No. electrified	BPL households (in million)
Sanctions in 10 th	235	97.33	2	68 763	111 936	8.31
Sanctions in 11 th	332	165.23	3.41	49 736	242 439	16.20
Total sanctions	567	262.56	5.41	118 499	354 375	24.6
Total achievements		153.47 (58.4%)	3.17 (58.4%)	64331 (54.3%)	88860 (25%)	6.89 (28%)

Source: Rural Electrification Corporation (2009).

As mentioned above, the ultimate objective and emphasis of the RGGVY is to provide grid quality power for all till 2012. Following this, there seems to be gap between the rural electrification agenda of the country as a whole if the utility of the solar energy and its development under the NSM is taken into account. Extending grid to rural areas is definitely going to increase the coal dependency of the power sector and result in huge transmission and distribution losses. At the same time even if surplus power from grid connected solar plants is able to create abundance of electricity, the supply of this power to distant areas would also amount to T&D losses of costly solar power.. In this regard it seems that the nodal ministries for implementing RGGVY and for implementing NSM have to interact more on how to take country's rural electrification agenda forward. Thus, . Ministry of Power through RGGVY under the Rural Electrification Corporation and the Ministry of Renewable Energy through NSM are trying to achieve the goal of rural electrification without clearly distinguishing the mandate and without much clarity in terms of targets. For example, RGGVY under the 11th Plan envisages electrifying substantial number of villages. At the same time RVE under NSM also envisages to take up substantial number of villages for installation of solar home lighting systems. There is no clarity as to the identification of target villages. Further, RGGVY's objective to make an arrangement in the village in a way that the present electrification is grid interactive for future purposes as explained above does not go with the spirit of the NSM which aims at reducing the coal dependency of the country by providing solar power and reducing the cost of the grid extension.

At this juncture it would also be important to analyze the progress under Remote Village Electrification Program (RVE) of the MNRE as the NSMs solar lighting and off-grid component.

7.0 FURTHERING THE REMOTE VILLAGE ELECTRIFICATION (RVE) PROGRAM OF THE MNRE WITH NSM-Need to understand the efficacy of RVE itself

The NSM's lighting and off-grid agenda relies on the edifice of the Remote Village electrification (RVE) program by the MNRE. RVE is run on the basis of the Census of un-electrified remote villages carried out by the Rural Electrification Corporation in 2007. Under this program villages left out under the RGGVY are identified for electrification. The Remote Village Electrification program (RVE) is responsible for electrifying un-electrified remote census villages with a population of less than 100 inhabitants¹⁸ and

¹⁸ The electrification of villages comprising more than 100 inhabitants will usually be undertaken by the RGGVY scheme through its DDG (decentralized distribution and generation) projects. To avoid overlap of efforts, close co-ordination between the RRGVY and the

remote un-electrified hamlets of electrified census villages where grid connection is either not feasible or not economical because they are located in forests, hills, deserts or islands and where RGGVY has not been able to reach.

The RVE program is implemented in the states by state-notified implementing agencies (SNAs), which receive 90% capital subsidy from the MNRE. A remote village or remote hamlet will be considered electrified if at least 10% of the households are provided with lighting facility¹⁹. Under the RVE program, the electrification process entails choosing the most adequate energy technologies through the identification of locally available energy resources. However, in the case where these solutions are proven unfeasible and if only means for electrification is through use of isolated lighting systems such as solar PV, the NSM's distribution of lighting systems and off-grid solar home lighting comes into picture. Currently, there is no clear mandate as to which villages will have solar stand alone and home lighting systems and villages where other appropriate technology options would be sorted. It is also discovered that villages having abundance biomass are also being provided solar systems leaving their biomass potential un-utilized and solar energy systems finding unnecessary deployment which could otherwise be used in places which do not have other RE source such as Biomass.

Whether electrified under RVE?

Having said this, the important policy aspect to be considered is whether villages that have been provided solar lanterns or home lighting systems under RVE and NSM are considered electrified? If yes then there are questions of equity and quality of power given to the most marginalized sections of society. If not what more needs to be done, preferably with the use of solar energy wherever sun energy is abundant.

Villagers in Rajasthan feel “Solar power is Second Class electricity”!- Need for awareness creation and changing the mindset

Many villagers in remote areas serviced under the RVE program that are not recipients of grid-distributed power feel discriminated against when they are provided with what they feel is “second-class electricity”. Such complaints have been taken up by some political parties which have been exerting pressure for grid power to reach their constituents, as opposed to stand-alone systems. As a consequence, the list of villages to be electrified under the Remote Village Electrification (RVE) scheme is being shortened each year. In any case, such electrification is still considered an interim solution as, ultimately, the grid is expected to reach these regions.

MNRE is said to be ensured mainly through the Rural Electrification Corporation, but currently its not happening the way it has been envisaged.

¹⁹ As per the 2004 definition of electrified village

8.0 INSTITUTIONAL STRUCTURES FOR RURAL ELECTRIFICATION IN INDIA-Understanding the delivery mechanisms for rural electricity supply in the country and its convergence with NSM

Having looked at the major Programs and their approaches for rural electrification in India, it is desirable to understand the institutional structure for implementing these programs. As it is clear that the rural electrification component of the NSM would fall under the RVE and RVE is being carried in the areas left out under RGGVY due to geographical or economic reasons, understanding the institutional structure to carry out these programs becomes extremely important

8.1 The Central and State governments' responsibilities in rural electrification programs

With the coming of the Electricity Act of 2003, the landscape of power sector reforms especially country's rural electrification scenario has undergone a huge change. The role of the central government became larger, as under the EA, 2003 both central and state governments took over joint responsibility for rural electrification. At the central level, the MoP develops rural electrification policies, monitors the program progress, sanctions projects and releases funds for project implementation. State governments are required to prepare rural electrification plans designed to assess in detail the means by which electricity is to be delivered - *i.e.* through grid extension or stand-alone systems -to the un-electrified households in their constituency. These plans also describe which available technologies will be considered, how compliance with environmental norms will be met, as well as more general information such as the number of un-electrified households in the target region and their distance from the grid. These plans are then co-ordinated between state governments, state utilities and other agencies by the Rural Electrification Corporation Limited (REC), a governmental body under the Ministry of Power that acts as the nodal agency for the RGGVY. While all this has been provided under the law, the coordination between different agencies is seldom found to be happening as the state of power in the rural areas has only improved slightly.

Another important institutional aspect to be considered is that that REC is not the nodal agency for RVE mentioned above which carries forward the mandate of the NSM. However, the data regarding villages left out under RGGVY is coordinated by the REC with the MNRE.

8.2 Institutional structure at the state level – implementing agencies

Under the RGGVY, state governments through their State Power Utilities (SPUs) are responsible for implementing the RGGVY in their territory. Central Public Sector Undertakings (PSUs)⁴³ can also assist the states in carrying out rural electrification projects through project formulation, planning and monitoring, and the provision of goods and services. The Rural Electrification Corporation (REC) has therefore entered into a Memorandum of Understanding (MoU) with some PSUs, namely NTPC, Powergrid, NHPC to make available management expertise and capabilities to the states that wish to work with them. The REC, as the nodal agency of the RGVVY, not only acts

as a lending agency, but also co-ordinates activities between the MoP and the MNRE, sets the framework for project implementation and monitors and evaluates projects to ensure their timely implementation. Under the Remote Village Electrification program, state nodal agencies are responsible for the implementation of rural electrification projects.

8.3 Institutional structure – lending agencies

Under the RGGVY, the MoP grants 90% of the cost of rural electrification projects. States are supposed to cover the remaining 10% of the cost either from their own funds or through loans from the REC or other institutions.

The three main financial agencies in the power sector are the Rural Electrification Corporation Ltd. (REC), the Power Finance Corporation (PFC) and the Indian Renewable Energy Development Agency (IREDA). Only the REC is authorized to act as the nodal agency or lending agency for rural electrification projects under RGGVY. IREDA supports a much wider range of projects in rural areas, including minor-scale rural electrification schemes through renewable energy applications focusing mainly on biomass and solar PV lighting systems. The PFC lends only to major generation and transmission projects, but not to rural electrification programs.

By and large REC acts as the main decision making agency regarding implementation and lending and selection of villages as to which villages will be electrified under the RGGVY or RVE. In this manner, it may be understood that the NSMs off-grid component will be majorly governed by the REC. *Howsoever; NSM does not include REC as one of the implementing agency in its institutional and implementation design.*

9.0 USING UNIQUE CONSTITUTIONAL POSITION OF SPECIAL AREAS OF GOVERNANCE FOR IMPLEMENTING NATIONAL SOLAR MISSION – accelerating rural electrification under NSM by involving Gram Sabha in the village energy development programs

In India, 7% of the population is nomadic and tribal communities roughly equal to the population size of Germany²⁰. This chunk of tribal population which includes the most marginalized section of people in the country lives primarily in areas known as Scheduled Areas²¹. Incidentally, all the states having Scheduled Areas have been identified as states having the maximum solar potential. These include Gujarat, Rajasthan, Chhattisgarh, Madhya Pradesh, Orissa, Jharkhand, Himachal Pradesh and Andhra Pradesh. With the 73rd Constitutional Amendment, the concept of Gram Sabha (the Village Assembly) got ingrained in the Constitution and paved the way for democratic decentralization with a special legislation named Provisions of Panchayat (Extension to Scheduled Areas) Act, 1996 (PESA).

²⁰ Deshmukh et al, Economic and Political Weekly, March 20, 2010

²¹ Scheduled Areas are the special areas of Governance under Article 243 (m) and Scheduled Vth and VIth of the Constitution. Scheduled V areas include Nine states in central and northern Indian and Andhra Pradesh in South Scheduled VI states includes North Eastern States.



PESA is a revolutionary piece of legislation that inspired tribal communities to exercise community control over natural resources and village development. Under PESA, people living in Scheduled Areas have been provided with special governance system at the village level where the people's assembly is self empowered to decide the priority for implementing development schemes and programs at the village and hamlet level.

9.1 Convergence of institutional structure under PESA, Act, 1996 and NSM

Under the present rural electrification design, remote and far flung villages including those in Scheduled Areas are out of the purview of RGGVY due to their remoteness and inaccessibility due to various reasons such as villages falling inside forests, National Parks, Sanctuaries. Therefore these fall under MNRE's RVE scheme and are likely to be covered under NSMs solar lighting program and off-grid applications. The institutional structure under RVE to implement NSM is through franchise systems created by DISCOMSs or State agencies. These can be NGOs or PRIs.

PESA provides number of provisions that can be utilized for the development of integrated village energy security programs in Scheduled Areas including distribution of solar lighting systems under NSM. Gram Sabha in Scheduled Areas is empowered to approve the plans, programs and projects for social and economic development before such programs are taken up for implementation²². For utilizing this provision in these areas it would be crucial that the NSMs lighting systems and off-grid application are implemented through Village Panchayats, and special committees constituted for such purposes. Panchayat laws in various states also provide for the constitution of special standing committees. Thus for example in Madhya Pradesh, Gram Sabha has the power to constitute special committee for carrying out development works. The Committee is known as Gram Nirman Committee. Further, in some of the states Gram Sabha has also been given Budgetary powers to carry out village economic and infrastructure development. Thus for example MP Panchayati Raj and Gram Swaraj Adhiniyam of 2001 provides for the establishment of Gram Kosh (Village fund) which shall be jointly managed by Gram Sabha and Gram Panchayat. It is crucial that villages under RVE are given 90 % subsidy and the remaining 10% of the subsidy has to be provided by states under their budgets. In

²² Section 4 (c) (i), Provisions of Panchayat Extension to Scheduled Areas Act, 1996

Scheduled Areas the remaining subsidy can be met by utilizing the village funds under the supervision of Gram Sabha for getting reliable supply of power and for ensuring village energy security.

9.2 Facilitation of land for small scale off grid solar energy plants in Scheduled Areas:

Under PESA, land in the Scheduled areas can only be acquired with the prior consultation with the Gram Sabha²³. As land has been estimated as the most competing and difficult resource not only for completing the NSM targets but for other renewable energy applications, the provisions of PESA can be creatively used for providing community or panchayat land for solar deployment in the village.

9.2.1 Creative use of Forest Rights Act for solar energy development in Forest Areas

Forest Rights Act, 2006 is applicable in all the categories of forest, National Parks and Sanctuaries. The Act provides for the development rights to the communities. More importantly the Act provides for the facilitation of up to one hectare of land and felling of 75 trees if the forest community living on such forest land decides for the use of such land for installation of non conventional energy resources²⁴. Clearly, the hurdle identified by the REC for electrifying villages in forest and other difficult areas can be done away with the creative use of Forest Rights Act, 2006. The Off-Grid installations under the NSM on forest land can be facilitated under the Forest Rights Act and using PESA wherever such villages fall in the Scheduled Areas.

The 2007 electrification census by the Rural Electrification Corporation under MoP stated that there are large number of villages that can not be covered under RGGVY due the reason that these areas fall under various categories of forest where the grid connectivity is difficult due to economic and environmental considerations. The requirement of Forest Clearance by the Forest Advisory Committee at the Central Government added to the complexity of the problem. At that time it was suggested that such villages could be “electrified” using locally available renewable resources under the RVE scheme of the MNRE. Given the experience under the RVE scheme, solar PV has been the most successful option for providing lighting facilities in the dispersed villages and villages inside National Parks and Sanctuaries. (See the Case Study Below)

Case Study 1: Village inside Guru Ghasi Das National Park (Chhattisgarh):

²³ Section 4 (i), Provisions of Panchayat Extension to Scheduled Areas Act, 1996

²⁴ Section 3 (2) of the Scheduled Tribes and other Traditional Forest Dwellers(Recognition of Forest) Rights Act, 2007



Roof top PV system installed at Small village in Guru Ghasi Das National Park, Chhattisgarh²⁵.

The village, falling inside the Guru Ghasi Das National Park consists of 30 households with a population of 200 people.

Earlier the village did not qualify under RECs rural electrification program. Some how it did not receive attention under RVE scheme as well

Recently, under a special program by the state government, a private developer has provided a 4 kw roof top PV that is able to provide light to the village for 4 hrs during night hours



CFLs are being used in the households and have been distributed free of cost to the villagers by the private developer.

Off-Grid Transmission lines have been laid by the developer with in the village area for which no permission was required from the forest department as the Gram Sabha has passed resolution for the laying of transmission lines

The case study above gives us to understand that in addition to PESA Act, yet another important legislation, the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 herein after the Forest Rights Act, meant for the welfare of forest dwelling communities can be very creatively used for rural electrification under NSM.

Case Study 2: Durbuk Block, Ladakh (Jammu and Kashmir)

²⁵ Chhattisgarh is one of the study states under the present study on the implementation framework for the National Solar Mission

Another Example of using local laws and community based arrangement of for the promotion of Solar Energy Development in the Hill areas such as Ladakh²⁶

Ladakh Autonomous Hill Development Council under the Act of 1995 provides for the control of all lands in the Ladakh region. At the same time Council is also empowered for carrying out development of non conventional energy in the region. The provisions of the Jammu and Kashmir Solar Policy 2010, Ladakh Vision, 2020 and the Special Package for Solar Energy Development in the Ladakh region. There is thus a need for integrating the components under various instruments for the implementation of NSM. The Case study below is an example and takes the idea of integrated energy planning further.



1. The project was successfully implemented by LEDeG, using support from the local institution the Autonomous Council and with technical support from a private developer TATA BP Solar India Ltd.
2. It used a participatory, approach since the time of conceptualizing of the project. All the villagers were involved in the activities of the project, including operation and maintenance of the systems. The power plant is now run and maintained by the REDCO, a cooperative society under the act. The operator of SPV system is a youth from the Tangtse village trained by a private developer to maintain and operate the system.
3. LAHDC and the District Administration played important roles in financing and supervision of the project. They were also actively involved in the proper execution of the project activities.
4. In addition, there was a high-powered project steering committee with the Chief Executive Councillor, LAHDC as Chairman and representative of MOEF, MNRE, ICEF and all members of Project Advisory Committee as members to take important policy decisions. The Committee met at least once every six months. The Executive Director of LEDeG and representative of TATA-BP were the joint conveners for the committee

²⁶ This is dealt with in detail in the study "Lighting up Ladakh", 2011 under the HBF-ELDF-Implementing National Solar Mission in India

X- SUMMARY OF KEY FINDINGS OF THIS STUDY AND RECOMMENDATIONS

1. The NSM is dependent the performance of its first phase and its later phases are contingent on the first phase outcomes. Certain portion of the subsidy is also contingent under a potential climate deal in future. There is thus an emergent need for accelerated progress for implementing the targets in the First Phase. Particularly, hurdles related to land availability and finance must be taken up not only by the Central Government but by the State Governments. Rural development institutes such as NABRAD should be integrated in the solar energy development.
2. The Rural Electrification and Solar Lighting component of the NSM constitutes a very small component of the NSM only 2 GW till 2022 out of a total of 22 GW. There is a need to increase the total share of solar lighting and off-grid small scale solar energy development in the remote and inaccessible areas where grid connection is difficult and economically unviable.
3. The committed subsidy allocated for solar lighting systems is only 7% of the total subsidy available for grid connected and off-grid components under the NSM. The remaining subsidy is contingent on foreign funding or market mechanism. There is thus an emergent need for increasing the share of the subsidy for solar energy for the poor either by direct allocation in the Budget or through carbon credits or any other means under clean energy development mechanism.
4. The solar lighting systems covers only one third of the power deprived population. The solar lighting systems to be distributed till 2022 cover only 10 million as against the requirement of 70 million. The number lanterns to be distributed should be increased. Further innovative and effective participatory mechanisms for such distribution by involving Panchayati Raj Institutions should be adopted.
5. The NSM has no integration with RGGVY for its Grid connected program. While Grid Connected solar is well supposed to complement mainstream power supply in the districts and towns by augmenting power generation under state utilities, a portion of grid connected power may also be used for villages peripheral to towns where the grid extension is available. These villages may receive benefits under RGGVY and NSM.
6. The Off-Grid component to be carried forward under RVE misses the integrated framework of Panchayat laws and forest laws. As RVE is extended to areas where Grid connection is not possible including forest and island areas, the possible spaces under various forestry and coastal laws need to be used creatively for implementing NSM under RVE.
7. The identification of villages falling with in forest areas and need to have a separate component for them under NSM is well felt. As it is well known that there is a separate legal and institutional regime for forest governance in the country. There are various laws and Programs where communities are directly involved in the development of villages adjacent to forest areas or on forest land. The NSM and the power sector schemes needs to draw benefit from those laws and use the spaces within the laws for more reliable and efficient solar energy development in these areas, keeping in mind the conservation aspects and the harmony with environment laws in the country.

8. Participation of local communities for operation and maintenance can ensure village energy security and create rural livelihood, this aspect has been completely missed under NSM and needs to be taken up.
9. Communities can also provide better monitoring and quality check, which is often given to franchise by the DISCOMS under RGGVY or RVE, these needs to be given to communities especially in Scheduled Areas. To this end, state governments should aim to organize the training of local youth and to set up village committees.
10. The NSM should draw lessons from successful examples of PV lighting systems in the world. Few examples include Lumina, Lighting Africa, Lighting a Billion Lives. As has already been emphasized the NSM should pursue a participatory process with the involvement of rural sector institutes and PRIs and all the important stakeholders including concerned civil society groups.