

STATE SPECIFIC ACTION PLAN

Bihar Renewable Energy Development Agency

Name of the Project: Capacity Building of SNAs and other key stakeholders for promoting RET based off-grid solutions for electrification in rural areas

Contract No: 11/15/2013/PMU/WB-2

Funding Agency: Ministry of New and Renewable Energy, Gol / World Bank

Consultant: World Institute of Sustainable Energy, Pune

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EXECUTIVE SUMMARY

The State Nodal Agencies (SNAs) originally were responsible for implementing the Ministry of New and Renewable Energy (MNRE) sponsored subsidy-driven renewable energy programs /schemes, mostly centered on stand-alone renewable energy devices such as solar home lighting systems, bio-gas plants, etc. Therefore, the SNAs were structured and equipped to handle RE based off-grid programs mostly using stand alone RE devices / systems by distribution of subsidies/grants received from MNRE. With the change in policy scenario, MNRE wants SNAs to enhance their capabilities for taking bigger responsibilities and perform their role in up-scaling off-grid RE program with the help of private entrepreneurs with sustainable market approaches. One of the key barriers for up-scaling and large-scale commercialization of RE-based-off-grid programs for energy access as identified by MNRE is the weak institutional and individual capacities of the SNAs.

To overcome this, MNRE and the World Bank has commissioned SNA capacity building study, wherein the consultant is required to undertake a study on capacity building of SNAs and other key stakeholders to enhance their understanding and vision in implementing RET based off-grid programs with the help of private entrepreneurs. WISE has been awarded the work of capacity building of SNAs of states comprising 1) Uttar Pradesh 2) Bihar 3) Jharkhand and 4) West Bengal. The study has been broadly divided into two parts – stage 1 and stage 2. During stage 1 of the study, the consultant is required to prepare state specific action plans (SSAP) for each of the states awarded for study. While preparing the SSAP, the consultant has to look into the key functional areas of the SNA namely (i) program planning and program implementation (ii) organization structure and human resource (iii) financial management and governance structure (iv) policy and regulatory framework. The scope of work under stage 2 involves actual implementation of the short term interventions proposed in the SSAPs. Stage 2 of study involves holding minimum of two combined skill up-gradation and training programs for the personnel of 4 states and other stakeholders to meet the requirement of skilled manpower for the development of rural energy access projects followed by a concluding workshop at the end of the study.

As part of the study, the consultant had made visit to the SNA and interact with the key officials of SNA. Necessary information and supporting documents were collected from the SNA to know the present state of working of SNA in the key functional areas and program implementation practices followed. Subsequent to visit of SNA, the consultant had reviewed the functioning of the SNA in the key functional areas by examining the data collected from the SNA. Whenever necessary, more information / clarifications were sought from the designated officers of the SNA. A diagnostic review report has been prepared for the SNA identifying the gaps/ short comings in the key functional areas of SNA. Based on the diagnostic review report, a state specific action plan (SSAP) has been prepared. Following interventions / measures has been suggested in the key functional areas of the SNA so as to enhance capacities of SNA and make it prepared for scaling up RET based off-grid programs in the state.

PROJECT PLANNING AND PROJECT IMPLEMENTATION

- ▶ BREDA needs to impart necessary training to its staff to undertake renewable energy potential assessment / mapping the potential areas for implementation of various RET

based off-grid systems / solutions across the districts / regions in the state. The necessary application software like PV-syst, GIS tools, METEONORM database should be made available to the staff by the SNA.

- ▶ BREDA should take initiative in developing web based online Grievance Redressal System for recording complaints from the beneficiaries about the RET based off-grid systems / application installed by the SNAs through toll free telephone number which is further integrated with web based complaint management system. This mechanism shall ensure both recording of the complaints and timely action for rectification of the fault / problem noticed in the RET based systems/ applications.

*The consultant has designed the web based online complaint registration and grievance redressal system for BREDA. The detail design and process flow diagram for the application is provided in **Annexure 1** of this report. The consultant proposed to support BREDA in implementing this intervention in stage II of the project.*

- ▶ The SNA shall set up an accreditation program for all off-grid renewable energy manufacturers, system integrators, developers, and O&M services providers, consultants etc from the state so as to create a database and ensure the adherence to required regulations.
- ▶ The SNA shall involve the engineering colleges / polytechnic institutes from the state in conducting testing of the RET based system/equipments on regular basis to ensure adherence to standards specified in the tenders floated for various works.
- ▶ Solar PV irrigation pump is one of the potential RE based off-grid applications for the state. Presently this program is implemented on large scale in the state of Bihar. For performance analysis of SPV pump an on line monitoring system with data logger can be established at BREDA office to access the online data of various pump installation sites from the head office.
- ▶ BREDA should formulate strategies for effective operation and maintenance of RET based off-grid systems / projects by involving local NGOs, and self help groups (SHGs). The local people needs to be trained to look after the operation and maintenance of RET based off-grid systems / solutions installed in their area, open supply outlets for spare parts in the rural areas.
- ▶ Standard guidelines / document for preparation of feasibility report / DPR study for mini-grid project can be prepared as reference document. This document should outline the standard methodology for site survey, RE potential assessment, demand survey, socio-economic survey, selection of RE technology and sizing of mini-grid power plant, design of power distribution network and techno-economic viability check for such projects.

*The consultant is preparing such manual / standard document for the SNA which can be used while conducting feasibility study / DPR for RE based mini-grid projects in the state. The brief content of the document is presented in **Annexure 2** of this report. The consultant proposed to consider this as short term intervention. .*

ORGANIZATION STRUCTURE AND HUMAN RESOURCE

- ▶ The SNA need to follow up with the state government and obtain necessary funding for development of infrastructure including creation of office building, field offices and training centre for the SNA.
- ▶ The SNA has established the Project Management Unit (PMU) at its head office for implementation of RE programs. But for long term sustainability the SNA has to recruit permanent staff on its role. As provided in the memorandum of association (MoU), the SNA with the approval of managing committee and government of Bihar should appoint permanent officers and staff on its roll including the supervisory staff to be deployed at field offices. The consultant has suggested the organization structure and organization chart by considering the new responsibilities /tasks the SNA has to perform in the future. As motioned earlier the SNA has to prepared for scaling up of RET based off-grid programs in the state with the help of private entrepreneur with sustainable business model.
- ▶ The consultant has designed a comprehensive skill up-gradation training workshop module for the field level staff of SNA (technicians/ operators) on solar PV based off-grid applications. It has been noticed that the bio-technicians working at field are technically qualified and are suitable for looking after bio-energy programs such as improved chulha, biogas, etc. Therefore they have limited exposure to new developments in the technology and RE sector. The program shall be of 2 days duration shall have class room session as well as hands on training at field.
- ▶ Followed by the 2 day duration skill up-gradation workshop for technicians, the consultant shall organize a 1 day workshop for the senior level /managerial level staff of the SNA office on RE based mini-grid projects covering policy, regulations, finance, business models and case studies from global best practices on implementation of RE based mini-grid projects.
*The consultant has designed the training module along with the program structure, course material and a manual for conducting O&M of solar PV based off-grid systems / applications in the field. The content of the training program and course material is detailed out in **Annexure 3** of this report. The consultant proposed to support BREDA in implementing this intervention in stage II of the project. The consultant proposes to organize a combined skill up-gradation training workshop for SNAs of Uttar Pradesh and Bihar at UPNEDA's Training Centre at Chinhhat, Lucknow.*

FINANCIAL MANAGEMENT AND GOVERNANCE STRUCTURE

- ▶ An ideal SNA should be a professionally managed and government-supported company or society or corporation, having technical and commercial experts on its board of directors / governing body, managed by a senior transferable bureaucrat. The SNA must be financially self-sustainable and use the government's schemes for larger benefits to the society, working for twin objectives of fulfilling social responsibility and spreading commercialization through proper marketing approach. The governing body or board of directors should focus on major policy initiatives to bring a revolutionary change in the renewable energy and energy conservation sector.
- ▶ The SNA may charge private promoters reasonable processing fees as a service charge for facilitating power projects in the state, which can also be a good revenue source (processing fees vary from Rs 0.25 lakh to Rs 5 lakh per megawatt from state to state).

Other minor sources of revenue to make the SNA self-sustainable are tender fees, business operations, consultancy etc. Needless to say, the deployment of funds in an efficient manner is also one of the key requirements for success. Hence, the ideal SNA will make optimum use of funds to achieve its social and commercial goals.

- ▶ The establishment section would amend the Service Rules of BREDA appropriately with the prior approval of governing council of SNA. The Service Rules can be amended by keeping in mind the organization structure proposed by the consultant under the functional area 'organization structure and HR'.
- ▶ The establishment section should bring out document clearly specifying the job profile and roles and responsibility of staff working at BREDA.
- ▶ The SNA shall establish management information system (MIS) at the head office with the help of expert in the field. It will be helpful in tracking the day-to-day activities in a routine manner. The progress work, requirement of any mid-term reviews and follow-up actions can be ascertained by the MIS.

POLICY AND REGULATORY FRAMEWORK

- ▶ The current RE policy issued by Government of Bihar needs to be amended by including separate section on promotion of RET based off-grid applications / projects in the state.
- ▶ The amended RE policy should provide a clear framework for implementation of RET based off-grid schemes in the state of Bihar, including the institutional arrangement, financial support, stakeholders participation in various RET based off-grid programs.
- ▶ The SNA should take initiative in providing easy and soft financing to RET based off-grid projects by utilizing micro-credit organization/ rural and cooperative banks / facilitating medium and small scale industries (SME) for manufacturing of RE based off-grid equipment /systems.
- ▶ The SNA should petitioned / follow up with The Bihar Electricity Regulatory Commission (BERC) for notifying regulations for operation of Mini-grid projects as per the recommendation of Forum of Regulators (FoR).
- ▶ Public-private partnerships should be encouraged to promote solar home applications in rural areas. In doing so, the government should clearly specify its grid expansion plans, and identify regions that are suitable for off-grid solar applications. Further, the government should prepare phase-wise targets for system deployment, establish a cost sharing mechanism, ensure product quality and provide partial subsidy to reduce upfront cost of solar systems. The public-private partnership may be implemented through Energy Service Company (ESCO) mechanism involving government, ESCOs empanelled by the local authorities and banks.
- ▶ Community participation should be encouraged in promoting off-grid technologies. The SNA should build up awareness about community-based projects; facilitate private participation through information dissemination and providing finance through banks. Community participation may be promoted through a joint venture between the community cooperative and private entity with clear distribution of labour among cooperative, private entity and a local NGO responsible for community capacity building.

- ▶ The government should promote business incubators using tax benefits, public-private partnership, low cost loans, encouraging private sector in technology tie-up. Besides, the government should (i) formulate and enforce regulations on product standards and requirements for manufacturers and installers, and (ii) support and promote testing and certification of renewable energy equipments.
- ▶ The SNA can engage dialogue with the neighboring country -Nepal whose experience in promoting sustainable energy technologies may become helpful for the country. The SNA can gain an understanding about government's participation, women participation in decision making and capacity development from Nepal's experience in rural energy development programmes.

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1. INTRODUCTION

1.1 UNDERSTANDING BIHAR

Bihar is one of the densely populated states in India with around 90% of the population living in rural areas. Though the economy of Bihar has recorded double digit growth, it still ranks at the bottom among states with respect to per capita income. The industrial sector in Bihar remains in a bad shape, with its growth rate much below the national average. In terms of income generated, the industrial sector in Bihar accounts for hardly 3.2% of the net domestic product of the state, whereas the national average is 20.1%. Small industries, dominated by tiny enterprises and artisan-based industries play a significant role in the industrial sector of the state. And with the division of the state into two, most of the mineral reserves have now passed onto Jharkhand. More than 50% of the state's population still lives below the poverty line, and continues to depend on agriculture as the prime source of livelihood. The farm/agricultural land-holding pattern is characterized by an overwhelming majority of marginal, small, semi-medium and medium farms. However, the agriculture sector does play an integral role in the development of the state because of the availability of fertile land and ample water sources. But erratic supply of electricity to the agricultural sector has pushed up the fossil fuel (diesel) demand especially for pumping purposes. This has made the agricultural sector unsustainable and has increased the state government's subsidy burden on diesel.

Also, as per the 2011 Census, around 85% households in the state do not have access to electricity. The state thus faces formidable challenges in meeting its energy needs and in providing adequate energy of desired quality in various forms in a sustainable manner and at competitive prices. In order to sustain the present GDP growth rate, the state needs to increase its primary energy supply and electricity supply in tandem.

Power Sector in Bihar: Bihar has the lowest annual per capita consumption of electricity in the country at 118 kWh, against the national average of 778.71 kWh. The state is facing acute power shortage not only for peak load, but also for base load requirement. Further, the power deficit is increasing year-on-year. The peak deficit has been around 30% from past 6-7 years. A number of projects have been approved by the state government to enhance the availability of power. Most of these power projects are under the Public-Private Partnership mode. Bihar has total installed power generation capacity of 525.8 MW. However, most of these thermal power projects are either closed or operating at de-rated capacity, and hence the installed capacity has less relevance when we see the actual electricity generation from these projects. At present, there are only 2 thermal power stations in the state sector — Barauni Thermal Power Station (2x50 MW and 2x110 MW) and the Kanti Thermal Power Station (2x110 MW). Due to various technical reasons and financial crunch, the present generation capacity of these plants is 50 MW–60 MW and 80 MW–90 MW respectively. Up to 15 March 2013, a total of 22,712 villages and 23,38,251 thousand BPL families have been connected to the grid under Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY).

Table 1 Census data of Households in Bihar as per source of Lighting

Total no. of households in Bihar	1,89,40,629
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No of households having electricity access for lighting	30,98,435
No of households using kerosene and other sources for lighting	1,56,12,491
No of households using solar lighting systems	1,09,389
No of households no lighting source	15040
Total un-electrified households	1,57,32,805
% of un-electrified households	83%

(Ref: Census 2011- Household by Main Source of Lighting)

The state government and the central government have the obligation to provide access to electricity for uplifting the livelihood of the population. Hence, providing access to all households has been accorded the highest priority.

Relevance for promoting RETS based off-grid projects /solutions: Presently, 85% of the households in Bihar do not have access to electricity and have to depend on fossil fuels for lighting purposes. The decentralized off-grid RET based energy systems or micro-grids based on locally available RE resources can provide these households with an alternative solution for providing uninterrupted electricity supply. The conventional grid extension may not be possible or financially viable in several pockets of the state. The programme based on off-grid RET based systems can be implemented in those places with locally available resources. This will prove to be a cost-effective solution to meet the local demand of electricity, and also save the state expenditure on the capacity addition of generating station as well as extension of transmission network.

Considering the future growth in demand of electricity and constraints arising out of conventional power generation in Bihar, large-scale deployment of RE would be a better solution in terms of energy access and energy security for Bihar. The development of RE is in a very nascent stage in Bihar. However, there is considerable potential for development of SHP, biomass and solar-based power projects in the state.

1.2 SCOPE OF WORK

WISE has been awarded the work of capacity building of SNAs in 'Block A' states comprising 1) Uttar Pradesh 2) Bihar 3) Jharkhand and 4) West Bengal. The scope of the work as agreed between MNRE and WISE, as given under the Request for Proposal (RFP) and the contract signed between MNRE and WISE is elaborated below:

Stage-I: Preparation of State Specific Action Plan (SSAP)

- ▶ Undertake diagnostic review of 4 states i.e. Uttar Pradesh, Bihar, Jharkhand and West Bengal.
- ▶ Sensitize the SNA management and state government on the critical issues that may exist in various functional areas, specifically governance structure, autonomy, available skills etc;
- ▶ Identify priority areas for capacity building and institutional strengthening; and
- ▶ Develop a State Specific Action Plan (SSAP) for given four states.

Stage –II: Implementation of the State Specific Action Plan (SSAP)

- ▶ Implementing a maximum of three short term interventions on organizational strengthening for the states which would be identified as quick wins from the previous stage.
- ▶ Holding minimum of two combined skill up-gradation and training programs for the personnel of 4 states and other stakeholders to meet the requirement of skilled manpower for the development of rural energy access projects.
- ▶ Holding final workshop in each state.

1.3 APPROACH AND METHODOLOGY

The concise objective of MNRE behind commissioning this study is to **undertake Capacity Building of SNAs and prepare them for promoting RET based Off-grid solutions for electrifications in Rural Areas in more innovative ways.** Traditionally in India the rural electrification program has been based predominantly on extension of centralized grid through RGGVY scheme. However, progress in household electrification under RGGVY has remained slow due to high cost of grid extension to remote areas, low paying capacity of the consumers and limited electricity demand in such areas. It is therefore advisable to extend the central grid only where it makes economic sense; alternatively following two off-grid RE options are advisable:

- ▶ Promote off-grid RE based energy access solutions for electrification of rural areas like solar home lighting in sparsely populated area with weak demand potential.
- ▶ Promote RE based decentralized distributed generation and supply projects (mini-grids) in the villages outside the reach of central grid where agriculture/commercial demand can come up in the future.

The consultant had therefore focused attention on the areas mentioned in (i) and (ii) above, while collecting the data as well as developing the diagnostic review report of the SNA. The State Specific Action Plan (SSAP) being developed by the consultant shall be directed towards capacity building of individual officials together with **strengthening of the institution for effective scaling up of the off-grid energy/ electricity access projects.**

Methodology

As part of the study, the consultant has got opportunity to visit the SNA for data collection and holding interaction with the key officials of SNA. At beginning of the study the consultant has designed the questionnaire / data collection format for collecting the data on the key functional areas of the SNA viz organization structure and HR, Project Planning and project implementation, Financial management and governance structure and policy and regulatory framework prevailing in the state. Prior to visiting the BREDA office (22-24 December 2014), the consultant had circulated the questionnaire / data collection format designed for collecting data on the key functional areas of the SNA. The Deputy Director, BREDA designated as nodal officer for this study help WISE team in collecting the requisite data / information available in the office. During the visit, discussions were held with the Assistant Director (Technical), and other key member of the Project Management Unit set up in BREDA to look after the implementation of different RE programs. Information was collected along with supporting documents on key functional areas with respect to the RE programs being managed by BREDA with special focus on RET based off-grid programs for electricity / energy access.

Preparation of Diagnostic review Report

Subsequent to visit to SNA, the consultant had reviewed the functioning of the SNA in the key functional areas by examining the data collected from the SNA. Whenever necessary more information / clarifications were sought from the designated officers of the SNA over telephone. The consultant had critically examined the present organization structure, human resource, project planning and project implementation procedures followed, financial management and governance structure and policy and regulatory framework that prevails in the state from the point of view of promotion of RET based off-grid solutions / systems in the rural areas. A diagnostic review report was prepared highlighting the gaps/ short comings noticed in the key functional areas of SNA which the consultant feel are directly or indirectly hampering the scaling up of RET based off-grid RE programs in the state.

Preparation of State Specific Action Plan

The State Specific Action Plan (SSAP) is prepared so as to overcome the gaps / issues identified in the diagnostic review analysis. The SSAP shall clearly specify the suggestions / interventions required to overcome the issues / gaps identified in the key functional areas of the SNA. The draft SSAP shall be presented before the SNA for incorporating their suggestion before finalizing it. Three short term interventions from the SSAP shall be selected for implementation after taking consent of MNRE and the SNA. The consultant shall help the SNA in implementing the three short term interventions.

Training Program and concluding workshop

The consultant shall organize two training programs for capacity building of the SNAs and other Key stakeholders. The concluding workshop shall be organized at the end of the project to share the findings and experience.

2 PROJECT PLANNING AND PROJECT IMPLEMENTATION

BREDA is implementing both MNRE sponsored as well as state government sponsored off-grid RE programs in the state. In addition, the Bureau of Energy Efficiency, Ministry of Power, has appointed BREDA as the state designated agency (SDA) for implementation of the provisions under the Energy Conservation Act in the state. The Bihar Hydro Power Corporation (BHPC) is responsible for development of decentralized distributed generation projects under the DDG scheme of the Ministry of Power and small hydro power projects up to 25 MW in the state. The DDG program is learnt to be transferred to BREDA soon.

Bihar, one of the most populous states in India has low per capita availability of electricity, much less than the national average. Around 83% households in the state still do not have access to grid electricity. The state government and the central government have the obligation to provide access to electricity for uplifting the livelihood of the population. Therefore, the promotion of RET based off-grid solutions for electrification of rural areas assumes top priority for the state and central governments.

RET based Programs / schemes implemented by the BREDA

The following RET-based off-grid programs / schemes are being implemented by BREDA for providing electrification / energy access in rural areas of Bihar. Some of these programs, particularly the rooftop solar PV program is also implemented in urban areas of the state.

I. Solar PV Power Plant (25 kWp)

Under this scheme, BREDA installs grid-connected rooftop solar PV (SPV) power plant of standard size of 25 kWp for the beneficiary. During the 12th plan period, BREDA proposes to install a total of 114 such plants having a capacity of 25 kWp each at 3 locations in each of the 38 districts of the state. The SPV power plants are designed to have six hours of autonomy period. In order to implement this scheme, BREDA receives 30% capital subsidy from MNRE while the remaining 70% is provided by the state government in the form of state level subsidy.

Interestingly, against the target of setting up 77 SPV plants of 25 kWp capacity each during FY 2013-14 and FY 2014-15, BREDA is setting up 114 plants in various districts across the state.

II. Solar PV Irrigation Pumps

BREDA is implementing solar PV irrigation pumps program on a large scale in the state. During FY 2014-15 and FY 2015-16, the SNA proposes to install around 3000 SPV pumps of 2 HP and 3 HP capacities in equal numbers. The SPV pump system consists of 1800 /2700 Wp solar array along with DC submersible motor pump of 2 /3 HP capacity. This scheme is implemented by availing financial assistance from both the central and state government. The central and state government provides 30% and 45% of the cost as subsidy respectively, whereas the end users meet 25% of the cost of the system. The SPV pump scheme has witnessed success in the state and has been accepted by the end users as it is beneficial for the farmers who could not irrigate their farms due to acute shortage of electricity. BREDA has installed 560 numbers of 2 HP pumps and 1000 numbers of 3 HP pump of such SPV pumps during FY 2012-13 and FY 2013-14 respectively, whereas installation of 300 SPV pumps during FY 2014-15 is in progress.

III. Roof top SPV Power Plant Program (50-200 KWp)

BREDA has installed grid-connected rooftop solar PV power plants of capacities ranging from 50 kWp-200 kWp on the rooftops of government / public sector buildings at different locations in the state. BREDA has made a provision for installation of 14 numbers such rooftop plants of government/public building during the 12th Five Year Plan. This program is also funded by the state and central governments.

IV. Solar Home-light and High Mast Program

Under this scheme, BREDA provides stand-alone solar home lighting systems / solar streetlights to poor people. The system consists of a 12 Wp solar panel, a 12 AH battery and white-LED of a minimum of 15 Lux capacity. Under this scheme, the end users are provided 90% capital subsidy (30% from MNRE and 60% from the state government, whereas the balance 10% is borne by the end user.

V. Solar Lantern Program

Under this scheme, BREDA provides solar lanterns to the poor people belonging to the schedule caste and schedule tribe community. The system consists of a 5Wp solar panel, a 7AH battery and a white-LED having a minimum illumination level in Lux at different distances. The state government provides 100% capital subsidy for implementation of this program as no central subsidy is available for this scheme.

VI. 100% Producer Gas Engine (32Kw with 60 Kw gasifier)

This scheme is implemented to establish producer gas run engines to locally generate and distribute electricity in rural areas. The private entrepreneurs are encouraged to set up such distributed generation and supply projects for providing electricity to un-electrified areas in the state. Along with MNRE subsidy of 30%, the state government also supports the program by providing 21% capital subsidy to the investors.

2.1 PROJECT IMPLEMENTATION ARRANGEMENT

BREDA conducts a transparent competitive bidding process for selecting the manufacturers / suppliers for installation of RET based systems /equipments under different programs elaborated above. BREDA has developed a standard tender document for each of the program outlined above. The tender document specifies the detail scope of work, along with the terms and conditions of the contract and technical specifications of the type of RET based system /equipment that needs to be installed under the contract.

Interestingly, BREDA conducts national-level competitive bidding using the internet platform through 'e-tendering' route rather than limiting the process to state-level or to empanelled suppliers/manufacturers / contractors associated with the SNA. It has been noted that this particular move of the SNA has resulted in the discovery of better products with lower system costs.

For monitoring the tender process and tender evaluation, BREDA has formulated a tender evaluation committee consisting of the following members

- ▶ Director, Deputy Director and Assistant Director of BREDA
- ▶ Professor from National Institute of Technology, Patna

- ▶ Representative from DISCOM
- ▶ Head of Energy Department, Government of Bihar

PMU officials check and inspect the material for quality periodically during execution of the work. Officials check the capacity and I-V curve of solar panel on random sample basis. Apart from this, the Assistant Director (Technical), BREDA, carries out random site inspection during the execution of the work.

The monthly progress report is submitted by the investor to BREDA on a regular basis. After completion of the work, BREDA conducts the final inspection, and after satisfactory completion of the work, 80 to 90% payment is released to the contractor. The balance is retained and released during the Operation and Maintenance (O&M) period of 5 years.

Operation and Maintenance: The manufacturer/ supplier of RET based off-grid systems is responsible for conducting O&M work of the systems for the five year period after installation and commissioning. The scope of work covers supply, installation, and operation and maintenance. The payment release terms are accordingly designed and part payment is retained so as to cover the operation and maintenance period.

Project Monitoring and Evaluation: There are no specific procedures / guidelines for project monitoring, data collection, report preparation and evaluation. The BREDA website does not display any data with regard to the status of RET based off-grid systems installed in the past or provide details of the end users who have benefited from different programs/ schemes undertaken by BREDA.

2.2 DIAGNOSTIC REVIEW AND IDENTIFICATION OF CRITICAL GAPS

- ▶ BREDA need to undertake renewable energy resource assessment to map the potential areas across the regions/ districts for implementation of RET based off-grid systems / projects in the state. The assessment should comprise such other information as would be useful in developing RET based off-grid systems / projects by private entrepreneurs, such as infrastructure availability, village-wise energy demand, purchasing capacity of consumer, etc.
- ▶ BREDA needs to make its website more informative and user-friendly. The website should provide all information related to the type of RET based off-grid projects / schemes being undertaken by the SNA along with information regarding the end users who have benefited from such projects / schemes. The website should also display the operating condition of RET based systems / equipments installed in the past.
- ▶ BREDA should devise a mechanism for effective operation and maintenance of RET based off-grid systems / projects by involving local NGOs, SHGs. Development of supply outlets for easy availability of RET based off-grid systems / parts and services in all regions of the state is necessary.
- ▶ A mechanism for recording complaints from the beneficiaries of RET based off-grid systems / equipments through toll free telephone numbers should be created. A complaint register can be maintained at the headquarters which can subsequently be linked to the BREDA website.

- ▶ A mechanism for monitoring, verification and performance analysis of the RET based off-grid systems / equipments installed in the past should be put in place. The job and responsibilities of monitoring, verification and performance analysis should be allocated to the field staff. Article 2.11 of the Memorandum and Articles of Association of BREDA provides for undertaking sponsor studies as regards cost analysis, techno-economics, and socio-economic conditions to assess the performance of New and Renewable Energy systems and devices.
- ▶ A guideline/ reference document for preparation of feasibility reports/detailed project reports for implementation of decentralized distributed generation and supply projects (mini-grid projects) should be developed with the help of private investors.

2.3 SUGGESTED INTERVENTIONS AND ACTION PLAN

- ▶ BREDA needs to impart necessary training to its staff to undertake renewable energy potential assessment / mapping the potential areas for implementation of various RET based off-grid systems / solutions across the districts / regions in the state. The necessary application software like PV-syst, GIS tools, METEONORM database should be made available to the staff by the SNA.
- ▶ BREDA should take initiative in developing web based online Grievance Redressal System for recording complaints from the beneficiaries about the RET based off-grid systems / application installed by the SNAs through toll free telephone number which is further integrated with web based complaint management system. This mechanism shall ensure both recording of the complaints and timely action for rectification of the fault / problem noticed in the RET based systems/ applications. The data stored in the online system can be further analyzed to know how efficiently a particular RE based off-grid system / application is working on the field. Such type of user-friendly online interface created for end users /beneficiaries to communicate with the implementing agency shall reduce the distance and time required in the communication and built confidence in the end users about the RET based off-grid applications .

*The consultant has designed the web based online complaint registration and grievance redressal system for BREDA. The detail design and process flow diagram for the application is provided in **Annexure 1** of this report. The consultant proposed to support BREDA in implementing this intervention in phase II of the project.*

- ▶ The SNA shall set up an accreditation program for all off-grid renewable energy manufacturers, system integrators, developers, and O&M services providers, consultants etc from the state so as to create a database and ensure the adherence to required regulations.
- ▶ The SNA shall involve the engineering colleges / polytechnic institutes from the state in conducting testing of the RET based system/equipments on regular basis to ensure adherence to standards specified in the tenders floated for various works.
- ▶ Solar PV irrigation pump is one of the potential RE based off-grid applications for the state. Presently this program is implemented on large scale in the state of Bihar. For performance analysis of SPV pump an on line monitoring system with data logger can be established at BREDA office to access the online data of various pump installation sites from the head office.

- ▶ BREDA should formulate strategies for effective operation and maintenance of RET based off-grid systems / projects by involving local NGOs; self help groups (SHGs). The local people needs to be trained to look after the operation and maintenance of RET based off-grid systems / solutions installed in their area, open supply outlets for spare parts in the rural areas.
- ▶ Standard guidelines / document for preparation of feasibility report / DPR study for mini-grid project can be prepared as reference document. This document should outline the standard methodology for site survey, RE potential assessment, demand survey, socio-economic survey, selection of RE technology and sizing of mini-grid power plant, design of power distribution network and techno-economic viability check for such projects.

*The consultant is preparing such manual / standard document for the SNA which can be used while conducting feasibility study / DPR for RE based mini-grid projects in the state. The brief content of the document is presented in **Annexure 2** of this report. The consultant proposed to consider this as 2nd short term intervention. .*

3. ORGANIZATION STRUCTURE AND HUMAN RESOURCE

The Bihar Renewable Energy Development Agency (BREDA) is registered as a Society under the Societies Registration Act 1860 in the year 1987. BREDA is headed by a Director, an IAS officer, and assisted by a Deputy Director deputed from the state government. The Managing Committee of the SNA consists of 11 members. The Secretary, Energy Department, Government of Bihar acts as the Chairman of the SNA, whereas the Director is the Chief Executive Officer of the Agency. The head office of the SNA is located in Patna in a rented premise. The SNA has a permanent staff strength of 27 on its rolls at its head office; most of them being non-technical. Besides the staff at the head office, the SNA has 87 bio-technicians on its rolls. These bio-technicians are deputed at the District Development Commissioner /District Management offices and are made responsible for overseeing the RET based off-grid program implementation at the field level.

A Project Management Unit (PMU) has been established at the BREDA head office in the year 2013, for which budgetary provisions were made under the sub-head 'Infrastructure Development and Capacity Building of BREDA'. The existing organization structure does not have separate divisions / sections to look after planning, finance, and accounts related work. Similarly, a separate technical division has also not been set up. At present, all activities related to technical / non-technical works are being carried out under the supervision of the Assistant Director (Technical), BREDA, who has been deputed from the state DISCOM.

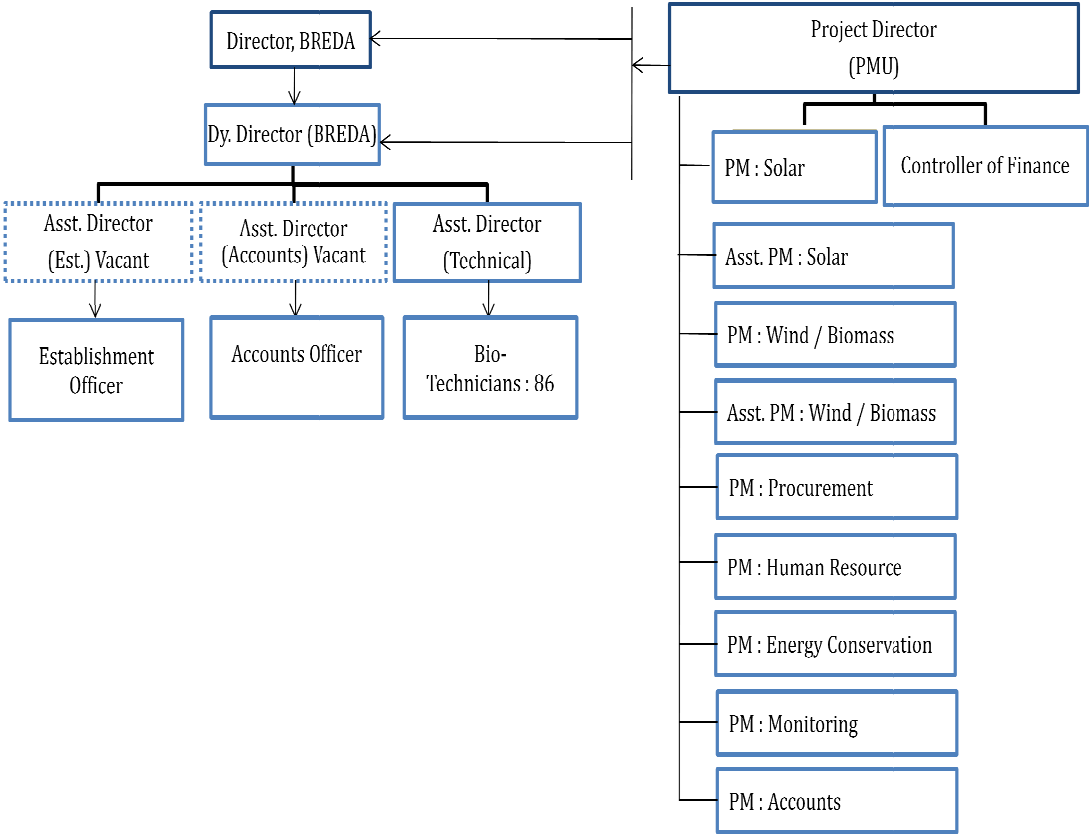


Figure 1 Existing organization structure at BREDA Head office

Table 2 List of officials working in BREDA at Present

S No.	Division of Posts	Sanctioned Posts as per Service Rule Book	Nos. of Regular Working Employees
1	Director	01	01
2	Deputy Director	01	01
3	Jr. Engineer	04	01 Note: (One post converted to Publicity Officer)
4	Accountant	02	01 (On Contract)
5	Clerk cum Typewriter	11	06 (Regular) 02 (Non-planned)
6	Stenographer	02	01 (Regular) 01 (On Contract)
7	Driver	04	01 (Regular) 03 (Non-planned)
8	Peon	04	04
9	State Level Jt. Director (Biogas)	01	00
10	Asst. Director	02	01 (On Deputation)
11	Assistant	01	00
12	Biogas Technicians	04	-----
13	Storekeeper	01	01
14	Treasury	01	01
15	District Level Asst. Biogas Officer	07	00
16	Jr. Engineer	07	00
17	Technicians	94+03	86 (Regular) 01 (Daily Wages)
Total		150	112

Office Assets and Facilities

- Desktop Computers: Head office-12, Field office-NIL
- Laptops: 13
- Computer Server: No
- Scanner: 9
- Printer: HO-10, FO-NIL
- Photocopiers: 1
- Fax: 1
- LCD Projector: NIL
- Video Conferencing Facility: NIL
- Intercom/ EPBAX: Yes
- LAN/ WAN: Yes

- Broadband Connectivity: Yes
- Geographical Information System (GIS) Software: No
- Landline Phones: 4 lines
- Vehicles Owned: 2
- Power Back-up: Generator back up

3.1 DIAGNOSTIC REVIEW AND IDENTIFICATION OF CRITICAL GAPS

- ▶ BREDA's present manpower strength and infrastructure availability is inadequate to promote and scale up the implementation of RET based off-grid programs / schemes in the state. The state government should provide necessary funding for development of infrastructure including the office building and other assets. The present office does not have a library and conference facility.
- ▶ The organization does not have separate sections to look after work related to finance, accounts, administration, and outreach and communications. It is important that the SNA should put in place the requisite skilled manpower to undertake these activities. Outreach and communication is the vital link in the information dissemination pathway that connects the agency to the outside world, spreading awareness among the people.
- ▶ The post of Assistant Director (Establishment) and Assistant Director (Accounts) are vacant at present. Both are critical from the point of view of smooth functioning of the SNA.
- ▶ BREDA Service Rules-2014 lay down designations of the staff for recruitment in BREDA. The proposed recruitment of technical staff in the Service Rules is limited to the post of Junior Engineers and Technicians. There should be a senior grade of technical officers such as Project Officers above the grade of Junior Engineers having expertise in techno-economics of different RE technologies at the BREDA head office.
- ▶ Article 2.15 of the Memorandum and Articles of Association of BREDA says that "in course of time when the scope of work and the responsibility of the agency expands, the agency shall have the power to appoint officers and staff on its roll on such terms and conditions which may be decided by the managing committee and approved by government of Bihar." At present, the Project Management Unit (PMU) under BREDA has 12 Project Managers who possess adequate technical / financial skills to implement RET based off-grid programs / schemes in the state. However, the present arrangement is on contractual basis and is therefore temporary. For long term sustainable operation of the SNA, BREDA needs to recruit manpower on a permanent basis.
- ▶ BREDA does not have field-level officers to supervise / monitor the implementation work at field level. At present, the 86 bio-technicians deputed at offices of various District Divisional Commissioner (DDC) / District Magistrate are responsible for carrying out work at the field-level. It has been noticed that these bio-technicians are technically qualified and are only suitable for looking after bio-energy programs such as improved chulha, biogas, etc. No periodic skills up-gradation programs have been conducted for the technicians, and therefore they have limited exposure to new developments in the technology and RE sector. The state has huge potential for deployment of decentralized solar based applications for providing electricity / energy access to the rural people. Therefore, the technicians need to be trained in the area of solar PV installation, operation and maintenance work, etc.

- ▶ The bio-technicians working in the field lack supervisory control. Officers of the grade of Junior Engineers /Project Officers should be therefore recruited, and made in charge of the field offices.
- ▶ The SNA does not have a library facility, conference hall and training centre. These three facilities are necessary for transfer of knowledge, sharing of experience and skill up-gradation. Non-existence of these facilities in the SNA limits the knowledge-based growth of the staff.

3.2 SUGGESTED INTERVENTIONS AND ACTION PLAN

- ▶ The SNA needs to follow up with the state government to obtain necessary funding for development of infrastructure including creation of office building, field offices and training centre for the SNA.
- ▶ The present structure of SNA suits for implementation of the MNRE subsidy driven renewable energy programs where the role of SNA is limited to distribution of subsidies /grants received from MNRE to the beneficiaries. In a changing policy scenario, the SNA would now require to take bigger responsibilities and perform its role in up scaling off-grid RE program with the help of private entrepreneurs with sustainable market approach. The SNA has established the Project Management Unit (PMU) at its head office for implementation of RE programs. But for long term sustainability, the SNA should have to recruit permanent staff on its role. As provided in the memorandum of association (MoA), the SNA with the approval of managing committee and government of Bihar could appoint permanent officers and staff on its roll including the supervisory staff to be deployed at field offices. The consultant has suggested the organization structure and organization chart by considering the new responsibilities /tasks the SNA has to perform in the future. As motioned earlier the SNA has to prepared for scaling up of RET based off-grid programs in the state with the help of private entrepreneur with sustainable business model. The revised organization structure / chart is shown in Figure 2.
- ▶ Periodical training to the SNA staff is essential to keep them up-date on latest knowledge in technical /financial / policy –regulatory aspect of renewable energy business. Training is also required to be imparted to the SNA staff dealing with the administrative / accounts / HR related works. At present there is no system for conducting regular training for SNA staff. There is no mechanism for training need assessment and budget provision for the SNA staff. Needless to say, the proposed future activities will need specialized training to make them capable of handling new job responsibilities. For enhancing the technical and administrative skills of the staff members, it is necessary to have special fund provision and training plan for all streams of staff members. The training may be organized in-house or externally. Some very essential training modules, institutions who could provide such training, duration, etc, are suggested below:

Table 3 Key areas of staff training and suggested Institutions

Module 1: Technical Areas

Training module	Topic	Duration (Days)	Target Group	Coverage	Training Institute
Module A	Solar Power Technologies	3	Div Head, Manager, Asst. Manager, Development Officer or equivalent	Solar insolation and potential sites, site suitability conditions, grid connected technologies (thermal and PV), world scenario, technology trends, etc.	Solar Energy Centre of India, WISE, IIT. Mumbai,
Module B	Project Appraisal and Approval Procedure	2	Div head, GM, Manager, Asst. Manager or equivalent	Grid and off-grid RE projects pre-feasibility report preparation, Techno-economic proposal evaluation criteria, Vendor/promoter selection procedure	WISE
Module C	Energy Conservation and Efficiency	5	Div head Manager, Asst. Manager, Development Officer or equivalent	EC Act, 2001, Sector-wise EC &EE potential; Auditing process and techniques; Role of Energy Auditors & Energy Managers, etc.	BEE, SEEM, IIT Mumbai, NPC
Module D	RE Policies and Regulatory Matters	5	Div head Manager, Asst. Manager or equivalent	RE Policies (grid and off grid), Tariff calculation parameters, Renewable Purchase Obligation, Renewable Energy Certificates, Open access and energy trading mechanisms, Energy exchange, etc.	WISE, IIT Roorkee

Module 2: Admin and HR

Training module	Topic	Duration (Days)	Target Group	Coverage	Training Institute
Module A	Service Rules and Labour Law	2	Div Head, Manager, Asst. Manager, Jr. Manager or equivalent	Central and State Government service rules, Company service rules, Applicability of Labour Law and important relevant cases, etc.	ASCI
Module B	RTI and Customer Care	2	PIO, Asst. PIO as designated or equivalent	Central and state RTI acts, effective utilisation and impact on system improvement, Customer care practices, Citizen charter and its wide publicity, etc.	State Govt trg Institute
Module C	Organisational Effectiveness.	3	Div Head, Manager or equivalent	Self awareness. Interactive communication skills. Group dynamics. Leadership styles. Negotiation skills. Motivating and developing subordinates. Managing stress.	NPC, NITIE
Module D	Human Resource Management	5	Div Head, Manager, Asst. Manager, (HR & Personnel) or equivalent	Manpower planning, Recruitment, Performance, career and succession management, Training, development and redeployment, Retention and motivation, Empowerment and team working.	NPC, NITIE

- ▶ The consultant has designed a comprehensive skill up-gradation training workshop module for the field level staff of SNA (technicians/ operators) on solar PV based off-grid applications. It has been noticed that the bio-technicians working at field are technically qualified and are suitable for looking after bio-energy programs such as improved chulha, biogas, etc. Therefore they have limited exposure to new developments in the technology

and RE sector. The program shall be of 2 days duration shall have class room session as well as hands on training at field.

- ▶ Followed by the 2 day duration skill up-gradation workshop for technicians, the consultant shall organize a 1 day workshop for the senior level /managerial level staff of the SNA office on RE based mini-grid projects covering policy, regulations, finance, business models and case studies from global best practices on implementation of RE based mini-grid projects.

*As part of SSAP, the consultant has designed the training module along with the program structure, course material and a manual for conducting O&M of solar PV based off-grid systems / applications in the field. The content of the training program and course material is detailed out in **Annexure 3** of this report. The consultant proposed to support BREDA in implementing this intervention in phase II of the project. The consultant propose to organize a combined skill up-gradation training workshop for SNAs of Uttar Pradesh and Bihar at UPNEDA's Training Centre at Chinhat, Lucknow.*

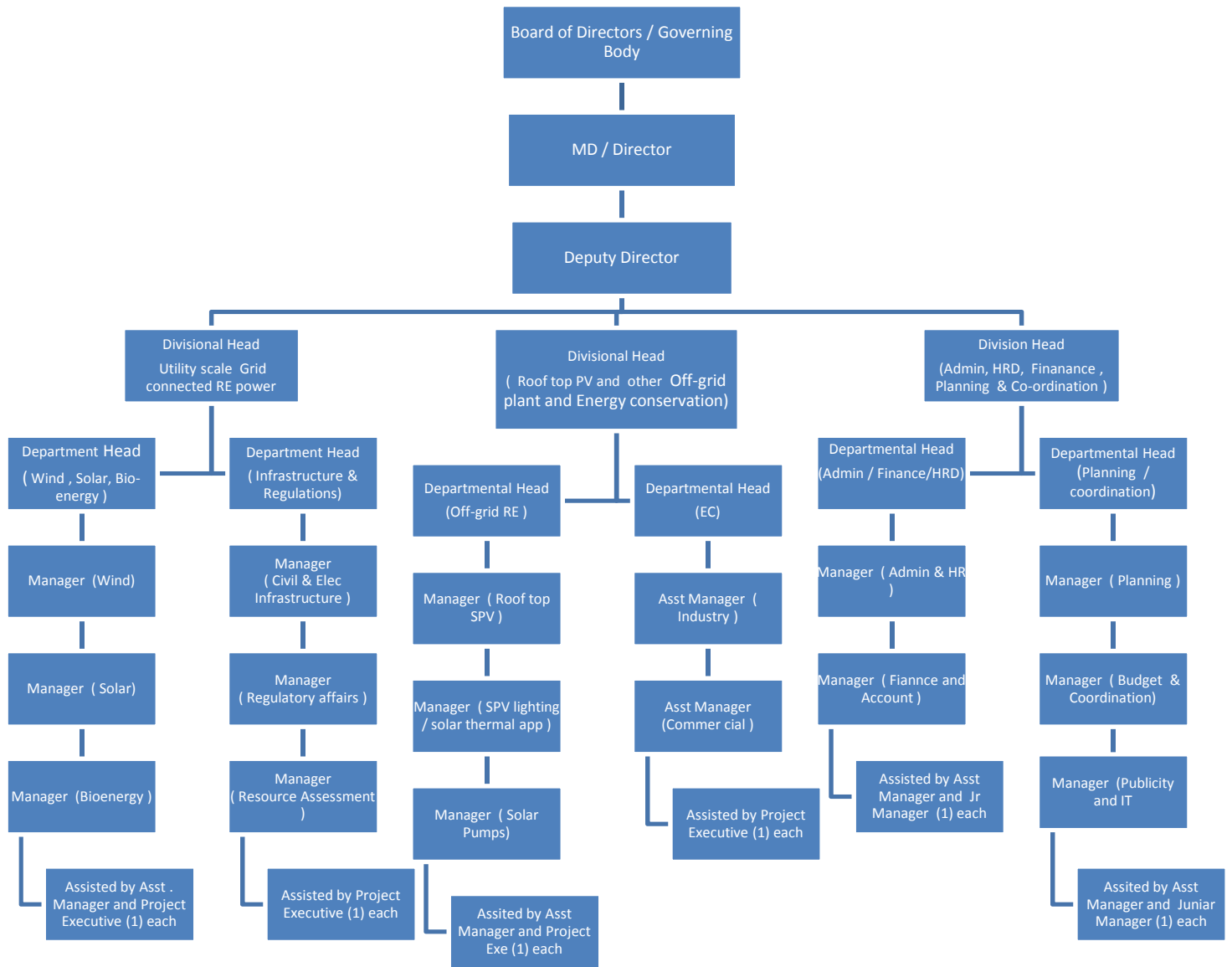


Figure 2 Proposed Organization Structure of BREDA

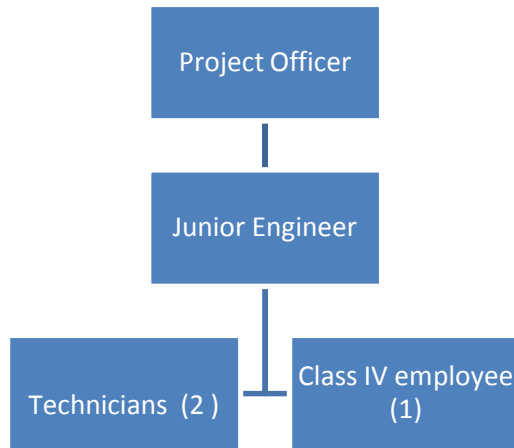


Figure 3 Suggested Staffing Pattern at Field office

4.1 POLICY AND REGULATORY FRAMEWORK

The Energy Department, Government of Bihar, notified the Policy for Promotion of New and Renewable Energy Sources, 2011, on 24 June 2011. The RE policy has the following provisions for development of RE in the state. ssss

RE projects implementing Agencies: The State Investment Promotion Board (SIPB), Department of Industry, has been designated as the sanctioning authority. The Bihar Renewable Energy Development Authority (BREDA) is the state nodal agency assigned with the task of RE project evaluation and further recommendation to SIPB. The Bihar state Hydro-electric Corporation (BHPC) has a mandate for development of small hydro power projects up to 25 MW along with the large hydro projects.

Incentives offered in the policy: The RE projects are eligible for availing incentives available under the State Industrial Incentive Policy notified by the Government of Bihar. The renewable energy projects are also exempted from the applicability of electricity duty. Entry tax is exempted on renewable energy equipment/devices. The provision of Section 14 of the EA, 2003, is made applicable to all new and renewable energy projects set up for generation and distribution of electricity.

Land for setting up the RE projects: The policy specifies access to land either through direct purchase by the developer or taking on lease government land in industrial areas. The policy allows use of agricultural land for non-agriculture purpose.

Regulatory Framework

RE Tariff: The Bihar Electricity Regulatory Commission (BERC) has specified tariff for sale of electricity generated from biomass, bagasse-based co-generation and solar power projects to the distribution licensee as per provisions under Section 61(h), Section 62 of the EA, 2003. The Commission has also notified solar tariff regulations specifying the normative technical and financial parameters for determination of generic tariff for solar power projects including rooftop PV and small solar power projects in the state.

RPO-REC Regulation: The Commission has notified the Bihar Electricity Regulatory Commission (Renewable Purchase Obligation, its Compliance and REC Framework Implementation) Regulations, 2010, as per provisions under Section 86(1) (e) of the Electricity Act, 2003. The Commission has specified year-wise RPO for the obligated entities starting from 1.5% during FY 2010-11, further raising it to 2.5%, 4%, 4.5% and 5% during FY 2011–12, FY 2012–13, FY 2013–14 and FY 2014–15 respectively.

As mandated in the Tariff Policy, the Commission has specified solar RPO as 0.25% of the overall RPO during FY 2012-13. The solar RPO is further increased by 0.25% every year thereafter till FY 2019-20 and by 0.5% during FY 2020-21 and FY 2021-22.

4.1 DIAGNOSTIC REVIEW, OBSERVATIONS AND IDENTIFICATION OF GAPS

In spite of a huge potential for promotion of RET based off-grid systems / solutions in the state, the RE policy does not have any specific provisions for promotion of such projects. Ideally, the RE policy should aim at providing access to lifeline electricity to the 85% un-electrified households using decentralized RE applications. The RE policy has the following gaps.

- ▶ Involvement of multiple agencies and fractured mandate for implementation of RE projects results in delay in execution of projects. The RE project sanctioning powers are vested with the State Investment Promotion Board (SIPB), while BREDA is made responsible for implementation of RE programs / schemes.
- ▶ The policy does not propose any financial schemes for promotion of RET based off-grid systems projects in the state.
- ▶ No provisions to encourage local RE manufacturing in the state.
- ▶ Target-oriented and time-bound programmatic approach is missing for large-scale deployment of RET based off-grid programs / schemes in the urban/rural areas.
- ▶ No provisions for R&D, human resources and institutional capacity building for large-scale development of RE.
- ▶ BERC has not notified the tariff for small and micro-hydro power projects in the state.
- ▶ BERC has taken the initiative for drafting the regulations for operation of decentralized distributed generation

4.2 SUGGESTED INTERVENTIONS AND ACTION PLAN

- ▶ The current RE policy issued by Government of Bihar needs to be amended by including separate section on promotion of RET based off-grid applications / projects in the state.
- ▶ The amended RE policy should provide a clear framework for implementation of RET based off-grid schemes in the state of Bihar, including the institutional arrangement, financial support, stakeholders participation in various RET based off-grid programs.
- ▶ The SNA should take initiative in providing easy and soft financing to RET based off-grid projects by utilizing micro-credit organization/ rural and cooperative banks / facilitating medium and small scale industries (SME) for manufacturing of RE based off-grid equipment /systems.
- ▶ The SNA should petitioned /follow up with the Bihar Electricity Regulatory Commission (BERC) should notify regulations for operation of Mini-grid projects as per the recommendation of Forum of Regulators (FoR).
- ▶ Public–private partnerships should be encouraged to promote solar home applications in rural areas. In doing so, the government should clearly specify its grid expansion plans, and identify regions that are suitable for off-grid solar applications. Further, the government should prepare phase-wise targets for system deployment, establish a cost sharing mechanism, ensure product quality and provide partial subsidy to reduce upfront cost of solar systems. The public-private partnership may be implemented through Energy Service Company (ESCO) mechanism involving government, ESCOs empanelled by the local authorities and banks.
- ▶ Community participation should be encouraged in promoting off-grid technologies. The SNA should build up awareness about community-based projects, facilitate private participation through information dissemination and providing finance through banks. Community participation may be promoted through a joint venture between the community cooperative and private entity with clear distribution of labour among cooperative, private entity and a local NGO responsible for community capacity building.

- ▶ The government should promote business incubators using tax benefits, public-private partnership, low cost loans, encouraging private sector in technology tie-up. Besides, the government should (i) formulate and enforce regulations on product standards and requirements for manufacturers and installers, and (ii) support and promote testing and certification of renewable energy equipments.
- ▶ The SNA can engage dialogue with the neighboring country -Nepal whose experience in promoting sustainable energy technologies may become helpful for the country. The SNA can gain an understanding about government's participation, women participation in decision making and capacity development from Nepal's experience in rural energy development programmes.

5. FINANCIAL MANAGEMENT AND GOVERNANCE STRUCTURE

BREDA does not have separate departments / sections looking after the planning, accounts and finance-related work. The Assistant Director (Technical) with the help of PMO staff in the SNA looks after preparation of the business plan for the state government-sponsored schemes for the SNA. The business plan is generally co-terminus with the Five Year Plan of the state government. At the beginning of the financial year, the annual business plan indicating the targets for various off-grid / grid-connected RET based schemes / programs and funding requirement for implementing such programs with state support is submitted to the state government. Once the program is sanctioned by the state government, the Director, BREDA is authorized to disburse funds from the state government and ensure timely payment to the agencies implementing the programs.

- ▶ Besides MNRE-sponsored programs, the SNA implements various state government supported RET based off-grid schemes/ programs, especially based on solar PV technology.
- ▶ BREDA's budget is divided into plan and non-plan grant. Plan grants are provided for implementation of various RET based programs/schemes in the state, whereas non-plan grants are provided for meeting the salary and administrative expenses of the staff. The plan budget prepared for the 12th Five Year Plan has provisions for development of small-scale decentralized RET based off-grid / grid connected schemes / programs. Budgetary provision has not been made for MW-scale grid-connected RE projects.
- ▶ The state government also provides funds to the district government / local government for execution of RET based off-grid programs to a limited extent.
- ▶ The business plan prepared by BREDA indicating major activities proposed in Bihar during the 12th Plan (2012-17) shows total state share of Rs.245.05 Cr for implementing most of the decentralized RET based projects based on solar technologies such as solar PV rooftop projects, solar home lighting systems, solar pumps, solar mast, etc.
- ▶ The state government provides funds for meeting the salary, wages and establishment expenses of SNAs through non-plan budget.
- ▶ The mid-term program implementation review is conducted by section heads.
- ▶ The internal and external audit is being conducted at regular intervals to check the cash inflow and outflow.
- ▶ The staff has access to the circulars and orders issued by the head office. The copy of such orders / circulars is displayed on the notice board and circulated to concerned officers as well as to other sectional heads for information.

5.1 DIAGNOSTIC REVIEW, OBSERVATIONS AND IDENTIFICATION OF GAPS

- ▶ Separate departments / sections need to be established in the SNA to look after planning, finance and accounts related work.
- ▶ SNA needs to be financially sustainable in the long term. At present, no revenue generating activity is carried out by the SNA.
- ▶ No capital investment program.
- ▶ There is no policy for time-bound career growth or mechanism for granting allowances and incentives to the staff.

- ▶ Management Information System is not established at present, and therefore no mechanism to track the day-to-day activities, progress, mid-term review and follow-up action.
- ▶ There is no mechanism for monitoring compliance to Rules and Regulations in the SNA .
- ▶ The Establishment Section has not prepared any document clearly specifying the roles and responsibilities for staff working in BREDA.
- ▶ BREDA Service Rules-2014 does not have provision for recruitment of higher level technical officers other than Junior Engineers. Also, the service rule does not specify desirable eligible qualifications for technical and non-technical staff to be recruited in BREDA.

5.2 SUGGESTED INTERVENTIONS AND ACTION PLAN

- ▶ An ideal SNA should be a professionally managed and government-supported company or society or corporation, having technical and commercial experts on its board of directors / governing body, managed by a senior transferable bureaucrat. The SNA must be financially self-sustainable and use the government's schemes for larger benefits to the society, working for twin objectives of fulfilling social responsibility and spreading commercialization through proper marketing approach. The governing body or board of directors should focus on major policy initiatives to bring a revolutionary change in the renewable energy and energy conservation sector.
- ▶ The SNA may install power projects with its own investments to ensure a long-term revenue source (Rajasthan is one such success story). In addition, the SNA may charge private promoters reasonable processing fees as a service charge for facilitating power projects in the state, which can also be a good revenue source (processing fees vary from Rs 0.25 lakh to Rs 5 lakh per megawatt from state to state). Other minor sources of revenue to make the SNA self-sustainable are tender fees, business operations, consultancy etc. Needless to say, the deployment of funds in an efficient manner is also one of the key requirements for success. Hence, the ideal SNA will make optimum use of funds to achieve its social and commercial goals.
- ▶ The establishment section would amend the Service Rules of BREDA appropriately with the prior approval of governing council of SNA. The Service Rules can be amended by keeping in mind the organization structure proposed by the consultant under the functional area 'organization structure and HR' .
- ▶ The establishment section should bring out document clearly specifying the job profile and roles and responsibility of staff working at BREDA.
- ▶ The SNAs has reported that it already have in place existing procedures for a) mail/file movement, b) mail/file tracking, c) communication within the organisation, d) file opening/closing, e) record keeping, f) safety of computerized records, g) asset management, h) follow-up of important decisions taken and tracking achievement vs. targets. However, all these procedures are being followed based on convention and there are no office orders defining the details of all the procedures. This work needs to be taken up on priority. Clear office procedure needs to be defined for all the related activities.
- ▶ The SNA shall establish management information system (MIS) at the head office with the help of expert in the field. It will be helpful in tracking the day-to-day activities in a routine

manner. The progress work, requirement of any mid-term reviews and follow-up actions can be ascertained by the MIS.

ENCLOSURES

Proposed Short Term Interventions for Implementation during Stage 2 of the Project

Annexure 1	Design of web based online complaint registration and grievance redressal system for the SNA
Annexure 2	Content of the Standard Document / Manual being developed for conducting feasibility study / DPR for RE based mini-grid projects in the state
Annexure 3	Training module, Program structure, content of course material and a manual for conducting O&M of solar PV based off-grid systems / applications in the field.

ANNEXURE 1

Design of Web Based Online Complaint Registration and Grievance Redressal System for the SNA

Web based online grievance redressal system shall be developed for recording complaints from the beneficiaries about the RET based off-grid systems / application installed by the SNAs through toll free telephone numbers which is further integrated with web based complaint management system. This mechanism will ensure both recording of the complaints and timely action for rectification of the problem. The data stored in the online system can be further analyzed to know how efficiently a particular RE based off-grid system / application is working in the field.

Customer / People complaints are part of business and it is very important to satisfy with proper system. The people need not go to the higher authorities always when they face problems. They can use the service of this online Grievance Redressal System (Toll free number with Integrated with web-based complaint management system) to give their complaint and the same will be forwarded to concerned department, where it is taken up by the employee of specified department and he /she takes action to solve the problem. In this way, online grievance redressal system satisfies the end users / customers by resolving their complaints and updating them with the complaint status.

Objectives / Vision:

To create a user-friendly online interface for the beneficiaries to communicate with administrative body and, reduce the distance and time barrier between citizens and administration.

The objective of Centralized Complaint System (online grievance redressal system) is to make people to get solved their problems easily by using the online complaint system.

Key Features of the System:

1. Toll free number with IVR System (for complaint registration)
 - Predefined welcome message script (as per your choice with Custom Voice)
 - Unlimited extensions
 - Web Interface
 - Voice Mail
 - Call Reporting
 - Call Forwarding
 - Music on Hold
 - Missed Call Reporting
2. Grievance Redressal System
 - User-friendly Interface.
 - Easy intake of user need.
 - manager, employee related user-id, passwords are send to their respective mails.
 - verification of manager, employee, public details

- Online interaction of administrator, employee and managers
- End to end interaction of employees with public
- administrator controls all department queries
-
- Reports
- Compliant status reports: daily / weekly / monthly / yearly report
- Escalation reports based on responsibility matrix queries and responses answered report
- Complaint report including complaint details, response details, feedback
- Performance reports - Section-wise customer-feedback reports.

Optional features:

- Online Surveys.
- Facility to upload photos of the complaint. for eg, photo / evidence of problem.
- Help pages in the form of forums and FAQs.
- Assigning performance ratings to different sections of SNA administration as per direct feedback received from users.

User interface priorities:

- Compatible with Internet Explorer, Opera, Google Chrome, and Firefox browsers.
- Reports exportable in .XLS, .PDF or any other desirable format.
- Professional look and feel
- Use of AJAX with all registration forms

Operational procedures and roles of different entities

A. RET based off-grid system registration by vendor / system provider /channel partner

- The concerned department in the SNA shall provide information to administrator (CMS cell) about the placement of order for installation of RET based off-grid systems along with the name of vendor.
- The administrator shall enter the information in the system and assign UID to each of the RET based off-grid system
- The administrator inform the vendor about allotment of UID
- The system provider/vendor completes the installation work as per provisions under work order and informs the beneficiary details to the administrator.
- The vendor shall ensure that the RET based off-grid system being installed by him should prominently display the UID allotted by the administrator.
- The beneficiary while registering the complaint through the online complaint redressal system shall enter the UID assigned to the system.

B. Procedure for registration of complaint by the users (beneficiaries)

- Users should be able to create new account, log-in to their existing accounts which will give them the authority to use the services provided by the system (such as complaint registration, status report etc).

- Authenticated users should be able to issue complaints, check complaint status, submit feedback, and browse through other complaints and their feedback.
- Authenticated users should be able to create suggestions/petitions; other users can support or make suggestions for petitions; forward petitions to corresponding authority for possible implementation.
- Users can to create groups where users can share their experiences; discuss common problems, and the possible solution;

C. Compliance by SNA authorities

- SNA authorities can log-in to their accounts as created by administrator.
- Authorities can access all the complaints, suggestions from users.
- Invoke proper activity in response to valid complaints, or redirect inappropriate complaints to the administrator.
- Give response to complaints with activity reports.
- Access to various reports mentioned in the report section.

D. Role of Administrators /CMS cell

- Create, and monitor accounts of authorities.
- Filter the content reported as inappropriate and handle threats.
- Handle complaints about improper response by SNA authorities.

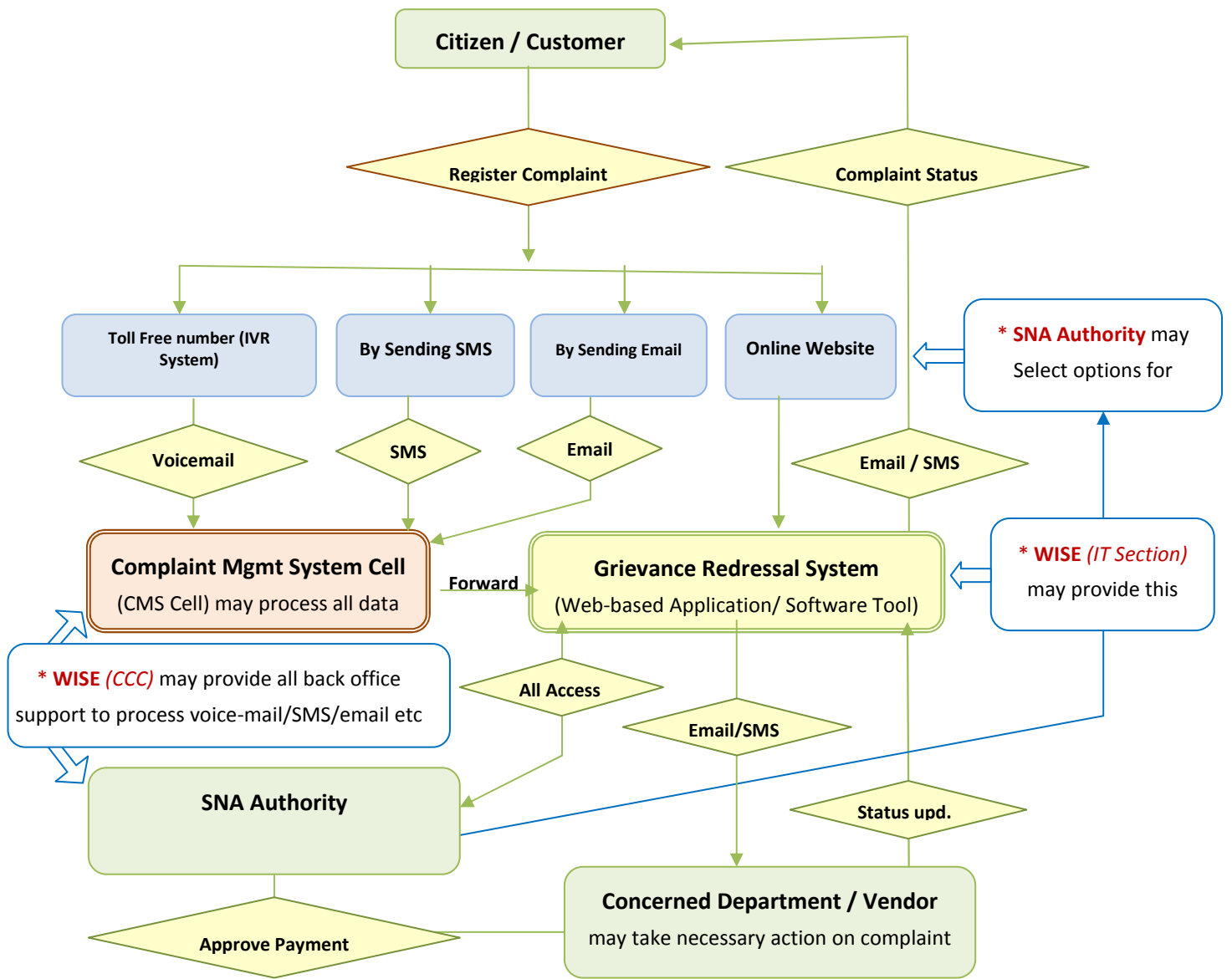


Figure 4 Data Flow Diagram:

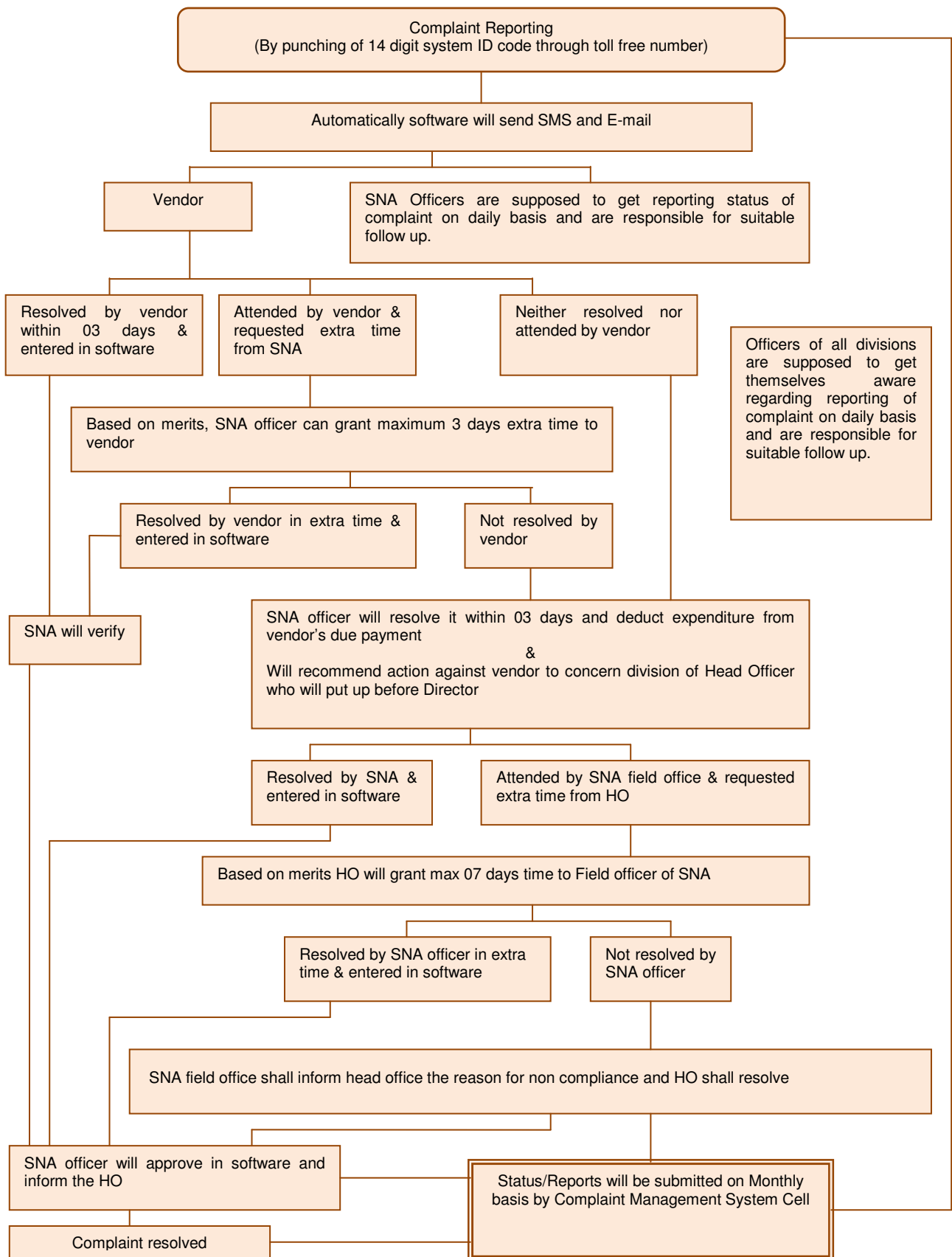


Figure 5 System Flow Chart: Web based Grievance Redressal System / Management Information System)

ANNEXURE 2

Content of the Standard Document / Manual Being Developed for Conducting Feasibility Study / DPR for RE based Mini-Grid Projects in the State

Renewable Energy based distributed generation and supply projects (mini-grids) are identified as a thrust area along with decentralized RE based energy access solutions /systems for electrification of remote areas in the states allocated to the consultant. The states if put in descending order show highest percentage of un-electrified households deprive from electricity compare to other states in India, Bihar (83%), UP (62%), Jharkhand (53%), & West Bengal (45%). There is ample scope for implementation of mini-grid projects which can use the local RE sources to generate electricity and distribute it to the surrounding areas. It has been noticed that large scale deployment of RE based mini-grid projects in rural areas can improve the socio-economic conditions of the villages since availability of electricity can encourage local commercial / industrial activities and create job opportunities.

During consultants visit and interaction with the SNA, it has been noticed that at present the SNAs do not have any standard manual /handbook which can be used as guidebook for preparation of feasibility study and DPR for the mini-grid projects. The consultant as well as the SNA is of the opinion that the such standard manual / handbook on mini-grid project shall be useful for the SNA and it can be used as reference document while conducting the feasibility studies and DPRs for mini-grid projects/ appraisal of the feasibility reports / DPRs submitted by the entrepreneurs . The standard manual on mini-grid projects shall cover the following topics:

Content of the Standard document manual

- ▶ Policy and regulatory framework for promotion of RET based off-grid projects in India
- ▶ Preliminary surveys / investigations to check the feasibility of mini-grid projects
- ▶ RE resource assessment studies
- ▶ Load profile survey of the consumers
- ▶ Socio-economic survey of the area
- ▶ Technology selection and sizing of power plant
- ▶ Power distribution network design consideration
- ▶ Economic viability of mini-grid project
- ▶ Questionnaires / survey forms for data collection

ANNEXURE 3

Training Module, Program Structure, for Conducting O&M of Solar PV based Off-Grid Systems / Applications in the Field

- i. Capacity building of field staff (technicians/ operators) in installation and maintenance of off-grid solar PV systems including preparation of O& M manual (Duration – 2days).
- ii. Capacity building of managerial staff on Policy, Regulations, financing and business models related with RE based off-grid projects (Duration – 1 Day).

Proposed Venue: For UP and Bihar - UPNEDA Training Centre at Chinhat, Lucknow

The field level staff of SNAs designated as technician / operator / mechanic is actually responsible for supervision and implementation of RET based off-grid programs at the field level. These persons are either posted at the field offices of the SNAs or deputed at the office of District Divisional Commission (DDC) of District Magistrate (DM). These technicians / operators are responsible for overseeing the implementation of RE based off-grid program implementation under the supervision of the Project Officer or sometime higher officers posted at SNA headquarters. The state of Uttar Pradesh, Bihar, Jharkhand and West Bengal have 150,108, 18 and 6 numbers of field level technicians / operators respectively. It has been noticed that these technicians are recruited long back at the time of establishment of SNAs and has undergone certificate course from Industrial Training Institute (ITI) or some of these technicians are SSC pass.

The technicians are basically trained to oversee the bio-energy programs such as improved chullhas, biomass gassifier systems etc. Very few periodic skills up-gradation programs have been conducted for these staff and therefore they have limited exposure to the new technological advances and applications related to Off-grid RE technologies especially solar based applications. All the four states have huge potential for deployment of decentralized solar based applications / systems for providing electricity / energy access to the rural people. With Central /state governments increased interest in solar power, it become imperative to train these field level technicians /officer in installation and maintenance of solar based off-grid systems / applications.

The proposed training module is developed keeping in mind the educational level of the field staff and the type of task /work they supposed to have performed. Hence in consultation with the SNA this particular training module is developed to train the SNA field level staff in installation and O&M of solar based off-grid systems /applications. The training module is developed to impart all requisite basic knowledge on Solar PV systems. The training program is divided in two parts:

- (i) Lectures /presentation on installation, O&M of SPV systems
- (ii) Hands on Training on the Field. The details of the program are given below.
- (iii) Explaining the use of O&M manual developed for solar PV based off-grid systems / applications

Following topics shall be covered in the 2 day training program developed for the technicians

SN Topics

A Lectures

1	Solar Photovoltaic market and applications
2	Basics of Solar Photovoltaic and Electricity
3	Solar resource assessment, site survey and PV module orientation
4	System components of Solar PV (module, battery, controller and inverter)
5	Stand alone solar PV system sizing
6	Installation of Mechanical and Electrical components of SPV System
7	O&M, and troubleshooting of SPV System
B	Hands on Training
1	How to use Measuring Instruments
2	Measuring of Electrical Circuit
3	Function Check of Charge controller
4	Inspection of SHS
5	Monitoring of existing PV system
6	Measuring Module output

WISE will develop a comprehensive course material which will cover the above topics in detail. The training module shall be delivered in 2 day training program with the help of internal /external experts in the field.

Training module for senior officers of SNA

Capacity building of managerial staff on Policy, Regulations, financing and business models related with RE based off-grid projects (Duration – 1 Day).

This training module is developed for the managerial / senior level staff of the SNA. The course is designed so as to sensitize the managerial staff of the SNA with regard to the recent policy and regulatory development in RE based off-grid projects. Global best practices in implementation of RE based off-grid programs including financing and successful business models shall also covered in this training module.

Program content

- ▶ Policy Framework for development of RE based off-grid projects in India
- ▶ Recent developments in formulation of Regulations for operation of RE based mini-grid projects
- ▶ Techno-economic viability analysis of RE based mini-grid projects
- ▶ Different Business models for RE based off-grid projects
- ▶ Best practices / selected case studies – National level
- ▶ International Best Practices in operating RE based off-grid projects (Bangladesh, Nepal, Philippines, Lao PDR)

Draft Program Sschedule for Training Programme on

Installation, Operation and maintenance of off-grid solar PV systems for field staff (technicians/ supervisors) of SNA

Lucknow / Kolkata / Ranchi | 2015

Venue:

Programme schedule

Day 1, 2015 (Lectures)

<i>Time</i>	<i>Content</i>	<i>Speaker</i>
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0930–1000 Registration

Opening Session: 1000 hrs to 1030 hrs		
1000-1005	Welcome	
1005-1015	Opening remarks	
1015-1025	Objective of the training programme	
1025-1030	Self Introduction of the participants	
Tea: 1030 hrs to 1045 hrs		
Session 2: 1045 hrs to 1315 hrs		
1045–1130	Solar Photovoltaic market and applications	
1130–1230	Basics of Solar Photovoltaic and Electricity	
1230–1315	Solar resource assessment, site survey and PV module orientation	
Lunch: 1315 hrs to 1415 hrs		
Session 3: 1415 hrs to 1545 hrs		
1415–1500	System components of Solar PV (module, battery, controller and inverter)	
1500–1545	Stand alone solar PV system sizing	
Tea: 1545 hrs to 1600 hrs		

Session 4: 1600 hrs –1730 hrs

1600–1645 Installation of Mechanical and Electrical components of SPV System

1645–1730 O&M, and troubleshooting of SPV System

Day 2,.... 2015 (Hands on training)

Session 5:1000 hrs to 1130 hrs

1000–1045 How to use Measuring Instruments

1045–1130 Measuring of Electrical Circuit

Tea: 1130 hrs to 1145 hrs

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Session 6: 1145 hrs to 1330 hrs

1145–1245 Function Check of Charge controller

1245–1330 Inspection of SHS

Lunch: 1330 hrs to 1430 hrs

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Session 7: 1430 hrs to 1600 hrs

1430–1600 Monitoring of existing PV system

Tea: 1600 hrs to 1615 hrs

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Session 8: 1615 hrs to 1745 hrs

1615–1745 Measuring Module output

Valedictory Session: 1745 hrs to 1800 hrs

1745–1800 Feedback

Valedictory

Training Programme on
**Policy, regulations, financing and business models related with RE based
off-grid projects**

Lucknow / Kolkata / Ranchi | 2015

Venue:

Programme schedule

Day 1, 2015

<i>Time</i>	<i>Content</i>	<i>Speaker</i>
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0930–1000 Registration

Opening Session: 1000 hrs to 1030 hrs

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1015-1025	Objective of the training programme	
1025-1030	Self Introduction of the participants	

Tea: 1030 hrs to 1045 hrs

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Session 2: 1045 hrs to 1245 hrs

1045–1145	Policy Framework for development of RE based off-grid projects in India	
1145–1245	Recent developments in formulation of Regulations for operation of RE based mini-grid projects	

Lunch: 1245 hrs to 1345 hrs

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Session 3: 1345 hrs to 1530 hrs

1345–1445	Techno-economic viability analysis of RE based mini-grid projects	
1445–1530	Different Business models for RE based off-grid projects	

Tea: 1530 hrs to 1600 hrs

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Session 4: 1600 hrs –1730 hrs	
1600–1645	Best practices / selected case studies – National level
1645–1730	International Best Practices in operating RE based off-grid projects (Bangladesh, Nepal, Philippines, Lao PDR)
Valedictory Session: 1730 hrs to 1800 hrs	
1730–1800	Feedback Valedictory

Organised by

World Institute of Sustainable Energy, Pune