STATE SPECIFIC ACTION PLAN

West Bengal 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, GoI / World Bank
Consultant:	World Institute of Sustainable Energy, Pune
Date:	April 2015

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.

STATE SPECIFIC ACTION PLAN

Organization Structure and Human Resource

- Present staff of the SNA is inadequate for scaling up implementation of RET based off-grid programs / schemes to the desired level. Therefore more technical staff needs to be recruited at appropriate level. For the supporting technical staff the minimum qualification may be fixed as engineering graduate.
- The SNA should recruit permanent manpower with appropriate skills to look after the work related to planning, account, and finance sections.
- WBREDA can establish regional offices with minimum staff for look after the regional level RET based off-grid installation. The establishment of regional offices would ensure proper O&M and performance monitoring of RET based off-grid systems / projects on a large scale.
- The clarity on roles and responsibility of each staff is necessary for efficient working. Therefore the administration of WBREDA should prepare such document defining roles and responsibility of the individual officers working in the SNA.
- The required training programmes for SNAs in long term perspective can be envisaged in different areas for various levels of staff.

  The consultant has designed a comprehensive skill up-gradation training workshop module for the field level staff of SNA (technicians/ supervisors) on solar PV based off-grid applications. Also the consultant shall organize a 1 day workshop for the senior level /managerial level staff of the SNA.

Project Planning and Project Implementation Practices

- WBREDA should formulate strategies for effective operation and maintenance of RET based off-grid systems / projects by empanelment of local manufacturers / suppliers / system integrators. A centralized mechanism can be developed by the SNA in which the SNA could fix up the service charges in advance payable to such empanelled companies for carrying out the O&M work as and when required. The empanelled companies and individuals have to follow that rate decided by SNA strictly. The empanelled companies and individuals would charge the system owners for the service they offered.
- Capacity building of technicians is essential for ensuring effective O&M of the RET based off-grid systems / projects installed in past. Various technical institutions in the state could take this responsibility of imparting the training. Some of the institutions can be worked as trainers' institute who will judge the capacity building requirement and give training to the trainers. The capacity development programme can be managed by WBREDA from funds available through the state government.
- Online consumer grievance redressal system can be set up for resolving the consumer grievance. A web based system with necessary software will be required to run this 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. Various platform can be created (voice, SMS, online) to register the complaint. After resolving the issue, vendors will update the status and then the completion message will be sent to customer as well as to SNA. Even, if required, the whole system can be put on the website

of WBREDA and general public can have the opportunity to view the complain status along with action taken by various agencies.

- The feasibility reports/ DPRs are the basic documents that provide information about the techno-commercial viability of any project to the investor as well as the sanctioning authority. Therefore a standard document outlining the methodology for conducting feasibility study / DPR would be useful for the investor to conduct such studies in a scientific way. The staff of SNA could also refer to such document while performing project appraisal studies.
- WBREDA 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. SNA should take up capacity-building to strengthen its resource assessment capabilities, especially in the areas of wind and solar energy.
- WBREDA has installed several RE based micro-grid projects in the state which are presently non-functional due to availability of the centralized grid. The generation component of those projects can be revived through pubic sector participation.
- Performance monitoring of installed RE off-grid system installed in past is essential to know the performance of the RET based systems and to make necessary changes in the design of systems to be installed in future. Presently, the RET based off-grid systems are not monitored. A systematic approach can be developed by WBREDA to monitor the RE based off-grid installations.

Policy and Regulatory Framework

- Renewable energy policy of West Bengal has no explicit provision for state subsidy support for off-grid RE projects. The policy therefore should provide financial support in the form of state subsidy for promotion of RE based off-grid systems in the state. Similarly, initial financial support in the form of subsidy should also be provided to RE based mini-grid projects for large scale implementation. Alternately, WBREDA can implement such programme independently by utilizing state subsidy, MP / MLA local area fund, corporate fund through corporate social responsibility and any other funding available.
- For scaling up of implementation of RE based off-grid systems / projects in the state, WBREDA can implement such programme with the help of local self help groups (SHGs) and regional rural banks or cooperative banks. The SHGs can be involved for promotion of solar or any other off-grid RE products among the members of the groups for which fund can be available from regional rural banks or cooperative banks. SHGs can be utilized for awareness creation and for increasing offtake of different off-grid RE products.
- The small and medium scale industries should be encouraged in manufacturing of RET based off-grid systems / spare parts etc locally. SNA could provide the necessary support to such industries through policy. The Government could offer various fiscal incentives in the form of reduction in VAT, reduction in octroi, reduction in property tax etc to encourage the small and medium scale industries to take up this task.
- For large scale deployment of RE based micro-grid projects in the state, the WBREDA should follow up with the WBERC to notify guidelines for implementation of such projects in the state in line with the model guidelines approved by the Forum of Regulators. The

guidelines can be framed on suo-moto basis or even WBREDA can take a lead role and file a petition for implementing such guideline for the state.

- The generating part / equipment of existing non-operational solar based mini-grid project / systems can be revived by WBREDA with public private participation. The private entities can be invited to take up the generation activity with their own finance. The generated electricity can be purchased by distribution utility to meet their renewable (solar) purchase obligation.

Financial Management and Governance Structure

- The budget for RE projects should be increased to scale up the implementation of RE projects in the state. For development of this sector, state government support is required. Therefore, SNA should request the state government to increase the fund allocation for the RE sector.
- In the existing fund allocation, solar is the only focus area. Other technologies like wind, biogas and biomass do not get enough funding support from the state government. Along with solar, WBREDA should equally promote other non solar RE technologies also. Such program can be financed through state government budget.
- WBREDA should initiate some revenue generating activities. Like other financially self sufficient SNAs, WBREDA can install own RE projects. Through generating electricity from such projects, SNA can ensure a regular cash flow. Other than this, WBREDA can charge consultancy fee for implementation of RE projects on behalf of other departments.
- New avenues for revenue generation and investments in renewable power generation projects are required to be undertaken by WBREDA. Sufficient funds could be generated by the SNA for running the programme/projects for long term without additionally burdening the exchequer beyond existing provisions. Some of the steps suggested are through own power projects, implementation of green cess on industrial and commercial customers, charging of processing fees, allocation through state budget, central assistance including NCEF.
- WBREDA can implement MIS system in the organization. For smooth and effective functioning of the organisation, MIS can be introduced in the SNA.
- WBREDA may prepare a document clearly specifying the rules and responsibility of the respective staffs. This will be useful for smooth functioning of the organisation and clear ambiguity, if any, in the respective role and responsibility of the staff.

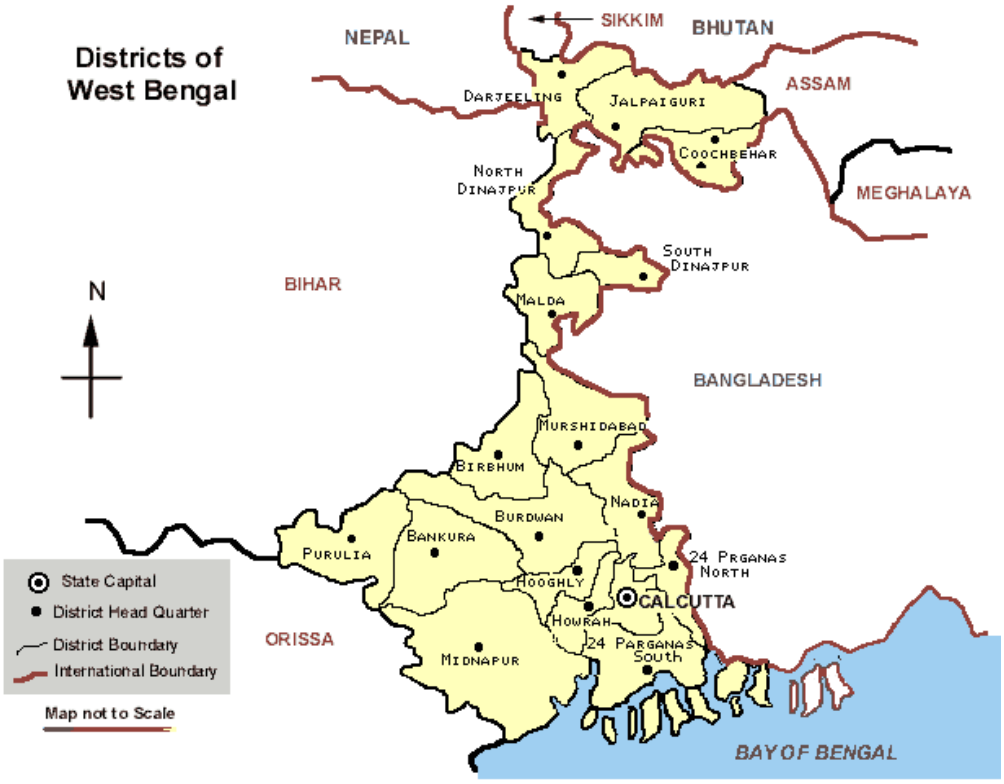
CONTENT

1 Introduction

1.1 ABOUT THE STATE

West Bengal is an eastern state stretching from the Himalayas in the north to the Bay of Bengal in the south. The state has a total area of 88,752 km² of which 13.52% is under forest cover and 65.48% is under cultivation. West Bengal occupies only 2.7% of the India's land area, although it supports over 7.54% of India's population, and is the third densely populated state in India with population density of 1028 inhabitants per square kilometre. The population of West Bengal was 91,276,115 in 2011 making the state the fourth most populous in India. The literacy rate of West Bengal is about 76.26%. About 68% of people live in rural areas.

Figure **1** Map of West Bengal



As per the report of Central Electricity Authority, the status of installed and allocated capacity of power generation projects as on 28 February 2015 in the state is as shown in Table below. The thermal sector contributes 85.56% of total installed capacity in the state and renewables are contributing only 1.37% of total installed capacity. Share of hydro power projects in total installed capacity is 13.05%. In total installation state sector projects have major share followed by private sector projects. Per capita consumption in the state of West Bengal is around 512 kWh per year.

Table **1** Sources of electricity (MW) in West Bengal

Ownership sector	Thermal			Total thermal	Nuclear	Hydro	Renew-ables	Grand total
	Coal	Gas	Diesel					
State	5220.00	100.00	12.06	5332.06	0.00	977.00	98.40	6407.46
Private	1941.38	0.00	0.14	1941.52	0.00	0.00	33.05	1974.57
Central	905.49	0.00	0.00	905.49	0.00	271.30	0.00	1176.79
Total	8066.87	100.00	12.20	8179.07	0.00	1248.30	131.45	9558.82

Source: Central Electricity Authority (CEA), Executive Summary – Power Sector, February 2015.

Renewable energy installation in West Bengal is just 131.45 MW. Installation of small hydro power projects is three-fourth of total RE installation. Solar power project installation has started in recent years only and total 7.05 MW have been installed. The details of RE installation are given in the table below.

Table **2** Grid-connected renewable power scenario in West Bengal

No.	Resource	Achievement (MW)
1	Wind	0
2	Biomass	26.00
3	Small hydro	98.40
4	Solar Power	7.05
5	Waste-to-energy	0
	Total	131.45

Source: Ministry of Statistics and Programme Implementation, Central Statistics Office, Energy Statistics 2015, March 2015.

In FY 2014-15 West Bengal has not met the energy requirement as well as pead demand. The shortfall in energy requirement in April 2014 – February 2015 period is 0.5% and shortfall in peak demand is 0.3%. The details are given below.

Table **3** Power supply position in West Bengal: April 2014- February 2015

Particulars	Value (MU)	Particulars	Value (MW)
Energy requirement	43072	Peak demand	7544
Energy availability	42843	Peak met	7524
Energy deficit/surplus	–229	Deficit/surplus	-20
Energy deficit/surplus (%)	–0.5	Deficit/surplus (%)	-0.3

Village level electrification has been almost completed. Among 37463 villages only 2 villages are remaining for electrification. Total number of households in West Bengal is 2 crores. Electricity is the main source of lighting for 54.5% total households, wheras in case of rural households the rate is only 40.3%. Similarly, 43.5% of total households and 57.8% of rural households are using kerosene as a source of lighting. However, 0.5% of total households do not have any source for lighting.

Table **4** Source of lighting at household level in West Bengal as per Census 2011

Source of lighting	Total households	Rural	Urban
	20067299	13717186	6350113
Electricity	10935123	5529496	5405627
Kerosene	8735299	7927731	807568

Source of lighting	Total households	Rural	Urban
Solar	238571	160497	78074
Other oil	42440	29974	12466
Any other	18305	10168	8137
No lighting	97561	59320	38241

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 WBREDA office (10-12 December 2014), the consultant had circulated the questionnaire / data collection format designed for collecting data on the key functional areas of the SNA. The Assistant Director, WBREDA, designated as nodal officer for this study, helped WISE team in collecting the requisite data / information available in the office. During the visit, Individual meetings were held with the Director / In-charge of the technical sections in the SNA. Information was collected along with supporting documents on key functional areas with respect to the RE programs being managed by WBREDA with special focus on RET based off-grid programs for electricity / energy access. Data relating to Administration, HR and Finance has not been shared by the SNA since it is confidential. The consultant has brought this aspect to the notice of MNRE at the time submitting the first Progress Report. The data of related functional areas as per scope of work which were shared has been considered only for this study.

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. The consultant had critically examined the present organization structure, human resources, 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 developed 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

2.1 DIAGONISTIC REVIEW

WBREDA is implementing both MNRE sponsored as well as state government sponsored RE programs in the state. The subsidy available from central and / or state government is disbursed through WBREDA to the beneficiaries. The SNA is involved in implementation of various types of RET based off-grid programs/schemes as given below.

I. Solar Street Light Program
II. Solar Lantern Program
III. Solar Home Lighting System Program
IV. Mini Grid Project Based on Solar / Biomass Power Plants
V. Rooftop Solar Power Plant

WBREDA has developed a standardized tender document for implementation of various programs /schemes based on renewable energy technologies. Selection of suppliers / manufacturers has been made based on the offers received in response of the tender. The tender document for selection of supplier/manufacturer for RET based off-grid technologies has been standardized, and programme / equipment specific deviations / requirements have been incorporated wherever necessary. The tender document also incorporates the provisions of post-implementation O&M (generally 5 years) and preparation of O&M manual in the local language. All projects / programmes have been implemented through tender route only. WBREDA is following e-tendering process strictly as per state government rules. An evaluation committee consisting of senior officials of WEBREDA and other state government departments has been formulated at WBREDA for tender evaluation.

WBREDA has not carried out empanelment of the RET based off-grid manufacturer / suppliers in the state. Similarly, WBREDA does not follow the 'Rate Contract' methodology which is generally followed by most of the SNAs for deciding the rate and suppliers / manufacturers of RET based off-grid systems / technologies. While designing the tender document, WBREDA follows the standard specifications laid down by MNRE for the RET based off-grid systems / equipments.

WBREDA assists other state government departments like the State Education Department, Fisheries Department, Panchayat & Rural Development Department, in implementation of RET based off-grid programmes in the state. WBREDA is conducting such programs on deposit contributory work basis. The State Education Department is implementing a major program of solar stand-alone power plants in various schools in un-electrified areas through WBREDA. Presently, various border district schools have been targeted for installation of solar standalone power plants within their premises. Even in schools and colleges located in urban or semi-urban areas, solar rooftop-based power plants through net metering arrangement have been implemented.

WBREDA also implements several off-grid programmes where part-funding is available from the MP / MLA local area fund. In these cases also, suppliers are selected through tender route

only. Depending upon the availability, the state government fund is also utilized along with MP/ MLA fund for implementation of RET based off-grid programs in the state.

User contribution is mandatory in all the programs, and as per availability of funds the user contribution varies program-wise. The user contribution is deposited with WBREDA. Panchayat, Block, and District level offices / officials are involved in various stages of implementing RET based off-grid programmes in the state. The local government agencies are mainly responsible for identification of beneficiaries and channelizing their contribution to WBREDA.

The practice of utilizing funding from various sections (state, central, MLA/MPs etc) along with mandatory contribution from end users has been proven useful in bringing down the beneficiary share to some extent and creating a sense of belongingness among the beneficiaries. In case of Remote Village Electrification (RVE) programme where 90% subsidy is available, user contribution is minimum.

West Bengal Green Energy Development Corporation Ltd (WBGEDCL) is the designated agency for implementation of decentralized distributed generation projects (DDG) under the RGGVY scheme of the Ministry of Power. WBREDA is not associated with the scheme. WBGEDCL prepared few DPRs under the DDG program and sent it for sanction to the state government and Rural Electrification Corporation. However, the projects did not materialized due to the DISCOM's plan for extension of grid in such identified areas.

WBREDA is the first nodal agency in the country to have conceptualized and developed RE based mini-grids in the un-electrified areas of Sundarbans. Due to its remote location and fragmented character, conventional grid extension was not possible in the islands. So the local electricity need was met through the RE based mini-grids. During the process, WBREDA gained valuable insights related to operation and maintenance of such plants in remote areas, which can be utilised by other nodal agencies. A total of 14 such mini-grids have been installed by WBREDA.

At present the mini-grids in Sunderbans—with the exception of one plant—are not operational due to extension of centralized grid in the area. In the planning stage, the distribution network of the mini-grid plant was developed keeping in mind the specification and norms generally followed by the DISCOMs. Therefore in later stage when the centralized grid reaches to such area it become easier to hand over the existing distribution network to the DISCOMS for further operation. It may be noted that before extension of the centralized grid to these areas, the mini-grid plant operated for 8-10 years. The achievement of renewable energy is west Bengal is given in the table below.

Table **5** Achievement of Renewable Energy in West Bengal (as on Nov 2014)

Sl.No	Sector	Unit	Achievement
1.	Solar PV Home Lighting system	Nos.	121000
2.	Solar PV Street Lighting system	Nos.	8725
3.	Water Heating System	Litre	40000
4.	Off Grid Stand Alone Solar PV Power Plant	kW	1661
5.	Micro Solar PV Power Plant	kW	1000

Sl.No	Sector	Unit	Achievement
6.	Roof top Grid Connected Solar PV Power Plant	kW	688.4
7.	Grid Connected Utility Scale Solar PV Power Plant	kW	7000
8.	Solar Water Pumping System	Nos.	10
9.	Wind Farm Project	kW	2000
10.	Wind Solar Hybrid	Nos.	6
11.	Improved Chulha	Nos.	370007
12.	Mini Micro Hydal	kW	24680
13.	Battery Operated Electric Vehicle	Nos.	10250
14.	Solar Passive / Solar Integrated Building	Nos.	28
15.	Energy Education Park	Nos.	3
16.	Total families serviced with power from RE sources	Nos.	203723

DIAGNOSTIC REVIEW AND IDENTIFICATION OF CRITICAL GAPS

- Most of RET based off-grid systems / projects are implemented in remote areas. The equipment supplier generally engages local people for carrying out the O&M work. Availability of O&M service providers close to the project location makes such systems/projects more reliable. Field-level experience of WBREDA shows that the RET based off-grid systems / projects in the rural areas are working satisfactorily even after completion of the mandatory O&M period. Owners of such projects / systems are getting regular O&M service due to availability of O&M service providers in remote areas. The established network of O&M service providers for undertaking the mandatory O&M for a fixed period can be utilized for maintenance of such systems for longer periods (after expiry of mandatory O&M period).
- WBREDA does not prepare feasibility reports /detailed project reports (DPR) for the rooftop solar PV projects implemented by them on behalf of various government departments /organizations. A simple 'Project Information Document' is being prepared and forwarded to MNRE for sanctioning the central subsidy. A standard document / guideline for preparation of the feasibility report / DPR for rooftop solar PV projects if developed will be helpful for the SNA in undertaking such projects in more scientific way.
- A citizen charter on renewable energy has not been prepared by WBREDA. The SNA should prepare and upload the citizen charter on its website for information of the public.
- It was noticed that while implementing the solar PV based mini-grid projects in the past, the SNA has not undertaken the feasibility / DPR study for assessment of resource availability, demand for electricity and socio-economic condition of the beneficiaries. A feasibility / DPR study should be carried out prior to installation of such projects . Such study should include demographic and social conditions of the selected areas, willingness to pay for the end users, local resource availability, demand projection (existing as well as future trends), RE supply options, optimization of the plant configuration, project financials, and project implementation arrangements, etc.

- The present non-functional solar /biomass-based mini-grids can be made operational for generation of electricity as substantial investment has been involved in those projects. The private sector can be involved in revival of generation plant component of the existing mini-grid projects.
- Present RE Policy notified by the state government is silent about development of RE based mini-grid projects in the state. No provisions are stated under the policy.
- The mechanism / guidelines for monitoring performance of the operational RET-based off-grid plants / equipments are not in place at present. Limited performance verification has been conducted by WBREDA on sample basis. The limited staff available in the SNA is involved in the performance verification process. WBREDA implements various RET based off-grid programs/schemes in the state. The large coverage and disperse nature of RET based off-grid programs make the O&M and performance verification tasks much more difficult. At present, WBREDA relies on users / beneficiaries to know about the working conditions of RET based projects / systems.

2.2 ACTION PLAN AND SUGGESTED INTERVENTION

- Various RET based off-grid projects implemented by WBREDA through tender route have been maintained by the system suppliers for a mandatory period of 5 years. The mandatory O&M requirement for 5 years is really a good practice followed by most of the SNAs for proper maintenance of the systems. However, the major concern is how to maintain those systems after completion of mandatory 5 years period. Presently, no such centralized mechanism exists in the state for maintaining those systems post mandatory O&M period. The existing RET based off-grid systems can be maintained only if such maintenance facility is available locally. Availability of such skilled technicians all over the state is a major concern in this regard.

  WBREDA should formulate strategies for effective operation and maintenance of RET based off-grid systems / projects by empanelment of local manufacturers / suppliers / system integrators. A centralized mechanism can be developed by the SNA in which the SNA could fix up the service charges in advance payable to such empanelled companies for carrying out the O&M work as and when required. The empanelled companies and individuals have to follow that rate decided by SNA strictly. The empanelled companies and individuals would charge the system owners for the service they offered.
- Capacity building of technicians is essential for ensuring effective O&M of the RET based off-grid systems / projects installed in past. Various technical institutions in the state could take this responsibility of imparting the training. Some of the institutions can be worked as trainers' institute who will judge the capacity building requirement and give training to the trainers. The capacity development programme can be managed by WBREDA from funds available through the state government.
- Online consumer grievance redressal system can be set up for the resolving the consumer grievance. A web based system with necessary software will be required to run this system. Through this system the consumer can directly register the problems regarding the non operating off-grid system. Various platform can be created (voice, SMS, online) to register the problem. The received grievance with the details will be sent to respective vendor with intimation to SNA for further follow up. Vendor will be required to attend the system within a

specified time. SNA has the monitoring role to check the status of the problem and if the vendor is not responding, then SNA can find alternative vendor to solve the problem. Otherwise, SNA can remind only once the alloted vendor regarding the same after completion of required time period. After resolving the issue, vendor will update the status and then the completion message will be sent to customer as well as to SNA. The required reports in desired format can be generated by SNA for monitoring purpose. Even if required the whole system can be put on the website of WBREDA and general public can have the opportunity to view the complain status along with action taken by various agencies.

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

- DPRs are generally not required for individual off-grid system installation. However, DPRs may be prepared for stand-alone solar systems, roof-top grid connected solar systems and RE based mini-grid systems. The feasibility reports/ DPRs are the basic documents that provide information about the techno-commercial viability of any project to the investor as well as the sanctioning authority. Therefore a standard document outlining the methodology for conducting feasibility study / DPR would be useful for the investor to conduct such studies in a scientific way. The staff of SNA could also refer to such document while performing project appraisal studies Such type of feasibility study is necessary for RE based micro-grid projects because in micro-grid projects generation and distribution both aspects have to be addressed. Also, the mini-grid project is not only involved generation and sale of electricity but collection of revenue and therefore total sustainability of the project in long term is required to be ensured at the DPR stage.

  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.*

- Resource assessment is the key to developing the RE sector in a state. SNA has not conducted any study related to assessment of the potential of wind, biomass, solar and other RE sources. In absence of the information of assessed RE potential of various RE sources in the state, appropriate programmes cannot be taken up by the SNA. Periodic assessment study for identification of new sites and resources needs to be undertaken by the SNA on regular basis. WBREDA 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. SNA should take up capacity-building to strengthen its resource assessment capabilities, especially in the areas of wind and solar energy.
- WBREDA has installed several RE based micro-grid projects in the state which are presently non-functional due to extension of the centralized grid to such areas. The generation part / equipment of such mini grid plants can be revived through pubic sector participation. The detailed intervention in this regard is given in Policy section.

- Performance monitoring of installed RE off-grid system installed in past is essential to know the performance of the RET based systems and to make necessary changes in the design of systems to be installed in future. Presently, the RET based off-grid systems are not monitored by the SNA. The SNA does not have field level establishment; this is also a constraint factor in this regard. A systematic approach can be developed by WBREDA to monitor the RE based off-grid installations.

3 Organization Structure and Human Resource

3.1 DIAGONISTIC REVIEW

The West Bengal Renewable Energy Development Agency (WBREDA) is registered as a Society under the Societies Registration Act 1860, and started its operation in the year 1993. WBREDA is established under the aegis of the Department of Power & Non-conventional Energy Sources, Government of West Bengal. The SNA is guided by the Governing Body, comprising Ministers and Secretary-level officials of the state as well as other eminent persons from the renewable energy field. The Chairperson of the Governing Body is the Minister in charge of Power & Non-conventional Energy Sources of the State of West Bengal. WBREDA has its own building at Salt Lake, Sector V, Kolkata. Different features related to green buildings have been incorporated in this building. The head office of the West Bengal Green Energy Development Corporation Limited (WBGEDCL) and a division of West Bengal Electricity Regulatory Commission (WBERC) are also located in the same building.

The organisation is headed by the Director. The Director–In-Charge of WBREDA is also the Managing Director of WBGEDCL. The difference in structure and mandate vested with the two organizations namely, WBREDA and WBGEDCL is explained in the following paragraphs.

West Bengal Renewable Energy Development Agency: WBREDA is registered as a Society under the Societies Registration Act 1860, and is established under the aegis of the Department of Power & Non-conventional Energy Sources, Government of West Bengal. It functions as the State Nodal Agency under the umbrella of MNRE for promotion and development of renewable sources of energy in the state. WBREDA mainly implements RET based off-grid programs/schemes such as solar PV based off-grid projects / schemes , biomass gasification based off-grid projects, biogas projects and mini-grid projects based on solar and biomass. Similarly, WBREDA implements small-scale grid-connected rooftop solar PV projects and biomass based power projects. WBREDA implements both MNRE funded as well as state funded RE programs / schemes in the state. MNRE and state subsidy is disbursed to the end-users / beneficiaries through WBREDA.

West Bengal Green Energy Development Corporation Limited (WBGEDCL): WBGEDCL has been created by the Govt. of West Bengal to promote different grid-connected renewable energy based power projects through the PPP mode, and also to ensure investment of the private sector in renewable energy. WBGEDCL is a joint venture company of the West Bengal Power Development Corporation Limited (WBPDCL), the West Bengal State Electricity Distribution Company Limited (WBSEDCL), and the West Bengal Renewable Energy Development Agency (WBREDA).

Staffing pattern of WBREDA: At present, total 57 persons are working in WBREDA, out of which 14 are permanent and on rolls of WBREDA. Out of the remaining 43 employees, 11 employees are on contract, while 32 are outsourced from other agencies.

The 14 permanent staff of WBREDA comprises the following officials:

- 2 Divisional Engineers (DE)
- 3 Assistant Directors (AD)

- 6 in the rank of supervisor (electrical and civil)
- 1 each in the post of stenographer, cashier, and peon.

Different types of RET based off-grid projects / programmes are headed by the Divisional Engineer and Assistant Director-level officials. The DE and AD report to the Director In-charge of WBREDA. The 6 supervisors on the WBREDA rolls, along with the supporting staff working on contract as well as the staff working on outsourcing basis, together provide assistance to the DE and AD for implementation of various programs.

The organization chart shown below reveals that the various RET based off-grid programs / schemes being implemented by WBREDA are distributed amongst the available senior officers (DEs & ADs). There are no separate technical divisions / verticals looking after a particular RE technology specific program. Similarly, a consultant is looking after the work related to Accounts and Finance section in the SNA. Overall, the solar programme is implemented by the 3 Divisions (headed by DE / AD) and these divisions are created according to the size of the project being handled by them. Three departments / divisions are presently looked after SPV projects with the capacity ranging from 0–10 kW, 10-30 kW and > 30 kW respectively. No separate division has been created for implementation of wind and biogas based projects in the state. In fact, no separate officials have been assigned for promotion of wind and biogas-based projects in the state. Biomass, biogas and wind-based projects are monitored by officials who also monitor solar projects.

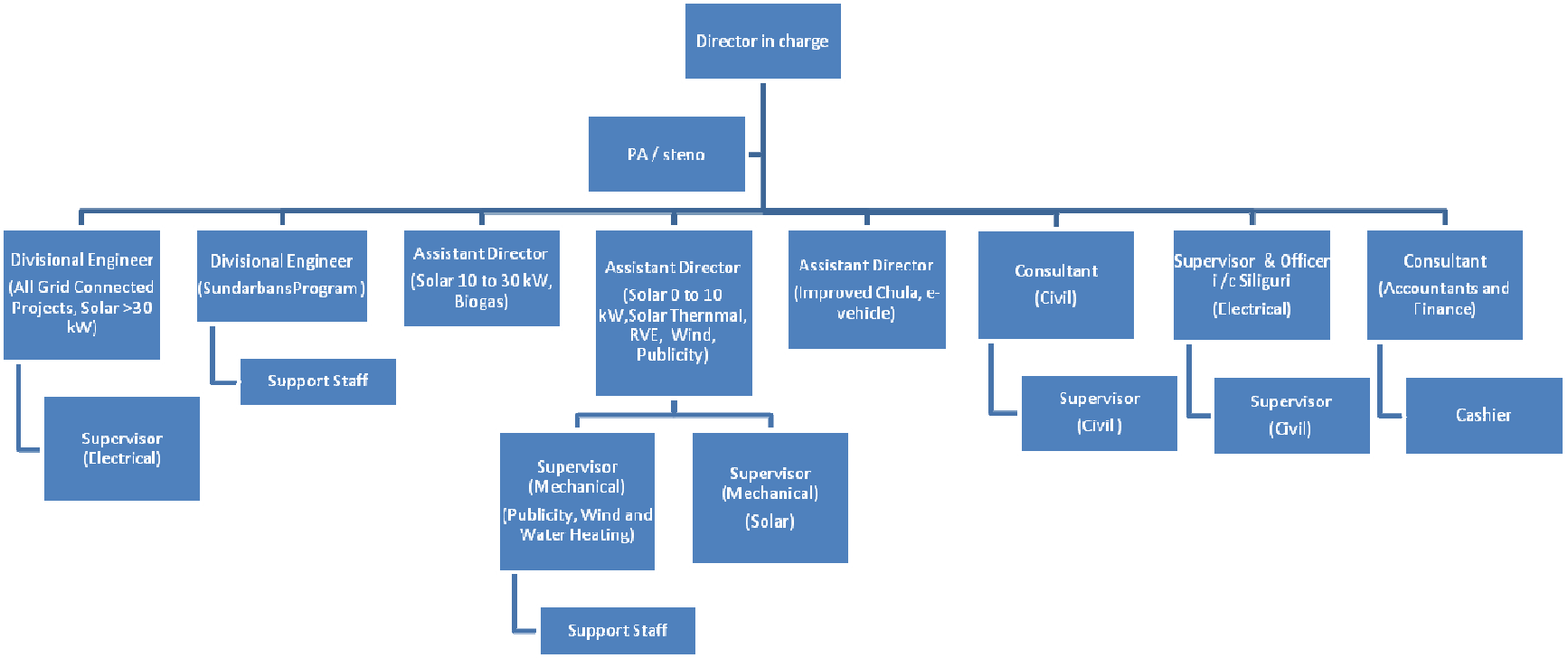


Figure **2** Present organization chart of WBREDA

DIAGNOSTIC REVIEW AND IDENTIFICATION OF CRITICAL GAPS

- There is ample potential for implementation of RET based off-grid projects based on solar and biomass resources in the state. The Government of West Bengal therefore needs to strengthen WBREDA for effective implementation of such programs. The current permanent manpower, especially the technical persons are inadequate to look after, monitor, and up-scale the programs. Restructuring of WBREDA with infusion of more technical manpower is essential for effective implementation of various programs in the state.
- There should be separate departments and skilled manpower in place to look after finance, administration, and planning activities in the SNA.
- WBREDA does not have any district / field level office other than an office in Siliguri (in North Bengal). All state-wide programmes are looked after and managed from the head office only. The scarcity of staff at the head office makes this task difficult and ultimately affects the implementation of the programs. Recently, an official of the rank of Divisional Engineer has been deputed for implementation of RET based off-grid programmes in the Sundarbans region.
- The technical manpower recruitment of WBREDA was done long back (last recruitment was done in 1995). The technical staffs have engineering background, but are handling same type of programme implementation since recruitment. They have sufficient technical knowledge and relevant experience in the respective field. However, during discussion with officials, it is understood that no periodic skill up-gradation programs have been conducted in the organization, and therefore they have limited exposure to new developments in the technology and RE sector. Various officials in the SNA are working in the same position since a very long time. Due to limited number of higher level positions within the organization, the chances of next promotion are limited.
- WBREDA does not have a document specifying clear role and responsibility of management and staff working in WBREDA. In such circumstances, it is difficult to undertake performance evaluation and identification of exact cause for problem /issues that may arise in delivering the services.
- The WBREDA staff has the necessary technical knowledge about the programmes they are implementing. However, skill development training programs are required for capacity building. The training requirement as envisaged for the technical personnel of SNA can be in the area of RE policy, regulations, finance and managerial skill up-gradation. The best practices followed in other SNAs can be incorporated in the training module for enhancement of knowledge of the SNA officials. The training is also required for operation and maintenance (O&M) of solar based technologies for local technicians who are involved in O&M. Other than these programs, general awareness programs are required for all stakeholders for the up-scaling of RE based off-grid projects.

3.2 ACTION PLAN AND SUGGESTED INTERVENTION

- Present permanent staff strength of WBREDA is only 14 and technical manpower is very limited. The technical manpower (DE, AD and Supervisor level) has to mange all the state-wide RE programme. Other supporting staffs are not permanent; they have recruited on contact basis. Therefore the available few technical officials in head office unable to get

technical support from the subordinate recruited on contract. Present staff of the SNA is inadequate for scaling up implementation of RET based off-grid programs / schemes to the desired level. Therefore more technical staff needs to be recruited at appropriate level. For the supporting technical staff the minimum qualification may be fixed as engineering graduate. They can be properly trained subsequently after recruitment so that they can be utilized for promotion of RET based off-grid systems / programme in the state.

- The SNA should recruit permanent manpower with appropriate skills to look after the work related to planning, account, and finance section. The staffs should have adequate knowledge of finance and accounts. The concerned officers should train to develop future business plan for the organization and involve in planning of revenue generating activity for the organization.
- The state-wide RE programmes in West Bengal is managed by WBREDA from it's headquarter in Kolkata. WBREDA has a regional office for North Bengal in Siliguri only. Therefore the management of state-wide programme from the head officer is a problem as for any work the WBREDA staffs have to go from headquarters to district place. WBREDA should establish regional offices with minimum staff for look after the regional level RE installation. Presently performance monitoring of RET based off-grid systems installed in the past has been conducted by WBREDA on sample basis only. The establishment of regional offices can ensure proper monitoring of RE systems on a large scale.
- Roles and responsibility of WBREDA staffs are not available as written document. The existing procedure has been followed in WBREDA. The clarity on roles and responsibility of each staff is necessary and WBREDA can prepare such document for smooth running of day to day activity. The document will ensure the responsibility of respective staff and would help staffs for proper execution of work.
- The required training programmes for skill development of SNAs in long term perspective can be envisaged in different areas for various levels of staffs. The suggested modules are given below.

Table **6** Proposed training module for WBREDA

Training Module	Topic	Duration (Days)	Target Group (From respective departments)	Coverage
Technical related				
Module A	Wind Resource Assessment and Technologies	5	Deputy Engineer, Asst. Director or equivalent	Wind Resource Assessment Micro-siting Introduction to wind resource assessment software Technology Options Energy Yield Calculations Grid Connectivity Infrastructure development Regulatory issues etc.

Training Module	Topic	Duration (Days)	Target Group (From respective departments)	Coverage
Module B	Solar Resource Assessment and Technologies	5	Deputy Engineer, Asst. Director or equivalent	Solar insolation and potential sites, Solar resource assessment, Relevant software for assessemnt Grid connected and off-grid technologies, Suitability of a site, Infrastructure development Regulatory issues etc.
Module C	Biomass & Waste-to-Energy Technologies	4	Deputy Engineer, Asst. Director or equivalent	Assessment of biomass waste available through agricultural surplus, Waste generation potential from urban solid and liquid sources, site suitability conditions, conversion technology options, technology trends, etc.
Module D	Off Grid RE Systems	5	Asst. Director, Supervisors or equivalent	Technical information / specification of off-grid RE systems based on solar, wind, biomass, biogas and hydro; Site suitability conditions, Operation and maintenance issues etc.
Module E	Project Appraisal and Approval Procedure	2	Deputy Engineer, Asst. Director, Supervisors or equivalent	Grid and off-grid RE projects pre-feasibility report preparation, Techno-economic proposal evaluation criteria, Vendor/promoter selection procedure
Module F	RE Policies and Regulatory Matters	5	Deputy Engineer, Asst. Director, Supervisors 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.
		Account related		
Module G	Accounting and Book Keeping	3	Account staffs or equivalent	Accounting Rules, Accounting Concepts, Financial Statements, Methods of Accounting, etc.
Module H	Financial Management	3	Account staffs or equivalent	Ratio Analysis, Cash flow and fund flow, Managerial Accounting, Budget/ budgetary control, Investment decision, etc.

- The consultant has designed a comprehensive skill up-gradation training workshop module for the field level staff of SNA (technicians/ supervisors) on solar PV based off-grid

applications. It has been noticed that the supervisors 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 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 WBREDA in implementing this intervention in phase II of the project.*

4 Policy and Regulatory Framework

4.1 DIAGONISTIC REVIEW

The Government of West Bengal published the Renewable Energy Policy during June 2012. The policy targeted 1040 MW and 2706 MW cumulative RE installations by the year 2017 and 2022 respectively. The resource-wise targeted capacity addition plan specified in the policy is given in the table below.

Table **7** RE Potential and Proposed Cumulative RE Capacity Addition in West Bengal (MW)

Resource	Potential	Cumulative Capacity Addition Target	
		End of 2016-2017	End of 2021-2022
Wind	450	75	450
Small Hydro	394	220	394
Co-generation	600	355	600
Biomass	662	240	662
Waste to energy	100	50	100
Solar	Not specified	100	500
Total	**2206**	**1040**	**2706**

Provisions for Small-scale RET-based Off-grid Projects

Biomass gasifier-based projects: The RE policy has provisions for development of small-scale biomass gasifier-based power projects. The policy envisages establishing 1000 rice-husk-based gasifier projects with an aggregate capacity of 20 MW by the year 2017. Presently, rice husk based gasifier projects have been implemented through MNRE subsidy in commercial establishments. Most of these projects have been set up by the rice mills for captive requirement.

Small-scale Solar Projects: The RE policy has provision for development of rooftop and small-scale solar PV projects in the state. The policy specifies 18 MW of targeted capacity addition under this category by 2017. The policy provides for all existing and upcoming commercial and business establishments having more than 1.5 MW of contract demand to install solar rooftop systems to meet at least 2% of their total electrical load. Further, all the existing and upcoming schools and colleges, hospitals, large housing societies and government establishments having a total contract demand of more than 500 kW will be required to install solar rooftop systems to meet at least 1.5% of their total electrical load. Moreover, growth centres, industrial parks, intelligent parks, etc., shall mandatorily employ the usage of the rooftop PV installations to meet some part of the in-house demand.

DDG Scheme: The policy recommends a DDG scheme for un-electrified and remote areas where conventional grid expansion is technically and financially not feasible. The DDG guidelines of the Ministry of Power also recommend implementation of the scheme in areas away from the centralized grid. According to the RE policy, the infrastructure to be built under the scheme has to be grid compatible.

Role of WBREDA and WBGEDCL: The policy has specified the role of WBREDA and WBGEDCL in implementing the RE programmes in the state. WBGEDCL will be the nodal agency and will facilitate the investment in the RE sector in the state. The role of WBREDA is to promote new and renewable energy technologies through demonstration projects. WBREDA is responsible for promotion of RET based off-grid projects such as solar, biomass/biogas, and also for disbursement of MNRE /state subsidy related to such projects.

REGULATORY FRAMEWORK

The West Bengal Electricity Regulatory Commission (WBERC) has taken the pioneering role of promoting rooftop solar PV projects and already formulated regulations on net metering for injecting surplus electricity produced from such projects into the grid. WBERC (Cogeneration and Generation of Electricity from Renewable Sources of Energy) Regulations, 2013, published on 22 March 2013 provides the norms for net metering. Any institutional consumer can set up such power projects under these regulations. As per the regulations, energy settlement with the licensee will be based on 'net' basis (i.e. energy injected vs energy supplied by licensee). However, any excess injection during the billing period by solar PV project can be carried forward to the next billing period and final settlement will be done on an annual basis. Around 688 kW capacity small scale solar rooftop projects have been installed in the state as on November 2014.

The RE-based mini-grid projects set up by WBREDA are outside the purview of WBERC. Most of the old mini-grid power plants are no longer operational. The distribution network constructed under for the mini-grid has been handed over to Distribution Utilities.

DIAGNOSTIC REVIEW, OBSERVATIONS AND IDENTIFICATION OF GAPS

- Although the RE Policy has stated targets and implementation arrangements for different RET based off-grid projects / schemes, it does not specify any type of financial support from the state government.
- The SNA has not taken any steps for formulating policy for providing easy and soft financing to RET based systems / projects such as utilizing micro-credit organizations/ rural and cooperative banks to promote RET based off-grid applications. Similarly, action has to be taken for facilitating small and medium scale industries for manufacturing RET based off-grid systems/applications.
- Recently, the Forum of Regulators (FoR) has taken an initiative and framed draft regulations for operating RE based off-grid generation and distribution projects under the franchisee model. The model regulations drafted by FoR specifies general guidelines for setting up mini-grid projects with the help of private entrepreneurs. The State Electricity Regulatory Commissions can make some changes and notify such regulations in the respective state. The WBERC has so far not notified guidelines / regulations for promotion of RE-based distributed generation and supply projects in the state.
- The generation plant component of the old mini-grid projects which are not functional at present can be revived as per the model regulations provided by FoR with private sector participation. WBERC can also take the initiative for notifying similar regulations at the state level for development of mini-grid projects on a large scale in the state.

4.2 ACTION PLAN AND SUGGESTED INTERVENTION

- Renewable energy policy of West Bengal has no explicit provision for state subsidy support for off-grid RE projects. The policy therefore should provide financial support in the form of state subsidy for promotion of RE based off-grid systems in the state. Similarly, initial financial support in the form of subsidy should also be provided to RE based mini-grid projects for large scale implementation. Alternately, WBREDA can implement such programme independently by utilizing state subsidy, MP / MLA local area fund, corporate fund through corporate social responsibility and any other funding available.
- For scaling up of implementation of RE based off-grid systems / projects in the state, WBREDA can implement such programme with the help of local self help groups (SHGs) and regional rural banks or cooperative banks. The SHGs can be involved for promotion of solar or any other off-grid RE products among the members of the groups for which fund can be available from regional rural banks or cooperative banks. SHGs can be utilized for awareness creation and for increasing offtake of different off-grid RE products.
- The small and medium scale industries should be encouraged in manufacturing of RET based off-grid systems / spare parts etc locally. SNA could provide the necessary support to such industries through policy. The Government could offer various fiscal incentives in the form of reduction in VAT, reduction in octroi, reduction in property tax etc to encourage the small and medium scale industries to take up this task.
- For large scale deployment of RE based micro-grid projects in the state, the WBREDA should follow up with the WBERC to notify guidelines for implementation of such projects in the state in line with the model guidelines approved by the Forum of Regulators. The guidelines can be framed on suo-moto basis or even WBREDA can take a lead role and file a petition for implementing such guideline for the state.
- WBREDA has implemented several mini-grid projects in the state in past; however, due to extension of the centralized grid in such areas these plants are not operating at present. The power distribution network developed in past have been transferred to local distribution utility. The generating part / equipment of existing non-operational solar based mini-grid project / systems can be revived by WBREDA with public private participation. The private entities can be invited to take up the generation activity with their own finance. The generated electricity can be purchased by distribution utility to meet their renewable (solar) purchase obligation.

5 Financial Management and Governance structure

5.1 DIAGONISTIC REVIEW

The state government of West Bengal provides plan and non plan expenses to WBREDA. The state government provides financial assistance in the form of subsidy for implementation of RET based off-grid programs such as programs based on solar home lighting systems, and solar street lights. The state government sanctions subsidy for the off-grid programme on the basis of request received from WBREDA. Along with the state government assistance, WBREDA also gets funding from MNRE for implementation of various RET based off-grid programs /schemes. WBREDA does not prepare long-term business plans indicating the targeted capacity installation and funding requirement for implementing various RET based programs. Instead, a yearly budget is prepared and forwarded to the state government for sanction.

The state government budget for the year 2014-15 shows total allocation of Rs.13.6 Cr for non-conventional energy sources, out of which Rs.1.6 Cr is shown as non-plan budget and Rs. 12 Cr for state plan budget. Non-plan budget is meant for meeting the expenditure on salary grant (setting up nodal cell for NRSE). From state plan budget, allocation for solar energy amounts to Rs.11.05 Cr. However, the fund for biomass, biogas and wind projects has not been earmarked for FY 2014-15. The details of the West Bengal government budget for non-conventional energy sector are provided in the table below.

Table **8** West Bengal Government Budget for Non-Conventional Energy
(FY 2012-13 to FY 2014-15) (in Rs Crore)

Particulars	FY 2012-13 (Actual)	FY 2013-14 (Revised)	FY 2014-15 (Budgeted)
Non-Plan			
Setting up of Nodal Cell for NSRE (salary grant)	1.45	1.46	1.60
Total non-plan	*1.45*	*1.46*	*1.60*
State Plan			
Implementation of biogas scheme	0.75	0	0
Procurement/installation of PV street light/PV pumps, etc	4.63	11.05	10.8
Procurement/installation of solar thermal devices	0.18	0.25	0.25
Procurement/installation of wind pump/wind farms, etc.	2.25	0	0
Tidal Power Plant	0	0.50	0.50
Energy Park	0	0.45	0.45
Total state plan	*7.81*	*12.25*	*12.00*
Grand total	**9.26**	**13.71**	**13.6**

Total budget for non-conventional energy has been increased during the last three financial years. Non-plan expenditure for salary component has also been increased over the years.

Solar PV sector had benefited but wind and biomass sectors have not benefited in the last two budgets.

DIAGNOSTIC REVIEW, OBSERVATIONS AND IDENTIFICATION OF GAPS

- The budgetary provision for the renewable energy sector is marginal compared to the potential for implementation of RE programs in the state. The budgetary provision for the renewable energy sector is 0.01% of the total state government revenue budget.
- WBREDA currently totally depends on the state government budget for meeting the plan and non- plan expenses. WBREDA has not started any revenue generating activity so far. For professional working and autonomy, WBREDA needs to generate revenue from its own projects. Several SNAs in India have adopted sustainable revenue generation models by installation of own RE power projects.
- The SNA does not have planned any capital investment program.
- The SNA does not have well-defined document specifying roles and responsibility of the management and staff.
- Management Information System is not established at present, and therefore no mechanism exists to track the day-to-day activities, progress, mid-term review and follow-up action.
- No monitoring mechanism has been set up so far for ensuring compliance to Rules and Regulations.

5.2 ACTION PLAN AND SUGGESTED INTERVENTION

- The budgetary provision for RE development is very minimal in state budget. The budget for RE projects should be increased to scale up the implementation of RE projects in the state. For development of this sector in the state government support is required. Therefore, SNA should request the state government to increase the allocation for the RE sector.
- In the existing fund allocation, solar is the only focus area. Other technologies like wind, biogas and biomass do not get enough funding support from the state government. Along with solar, WBREDA should equally promote other non solar RE technologies also. Such program can be financed through state government budget.
- WBREDA is completely financialy dependent on state government. The SNA do not have any revenue generating activities. Therefore, WBREDA should initiate some revenue generating activities. Like other financially self sufficient SNAs, WBREDA can install own RE projects. Through generating electricity from such projects, SNA can ensure a regular cash flow. This will reduce the dependency on state government for required fund. Other than this, WBREDA can charge certain fees for implementation of RE projects on behalf of other departments.
- New avenues for revenue generation and investments in renewable power generation projects are required to be undertaken by WBREDA. Sufficient funds could be generated by the SNA for running the programme/projects for long term without additionally burdening the exchequer beyond existing provisions. Some of the steps suggested are as follows.
    i. Own power projects: At present, WBREDA owns wind power project and sell it to distribution utility at tariff fixed by WBERC. However, this capacity may be increased

to increase the revenue source. WBREDA can have its own wind power project at one of the two most prospective wind farm sites, Frazergunj and Sagar Island, which are located in southern part of West Bengal. Also, WBREDA can set up own solar projects in the prominent location in the state and earn substantial revenue. This will provide long-term revenue to the agency. Rajasthan and Maharashtra SNAs are good example in this regard, who have installed own power projects and earning regular income through sale of electricity from those projects.

ii. Green cess: The Government of WB may consider levying a green cess on the electricity consumption by industrial and commercial consumers. It will be a very welcome move for promotion of renewables in the state. The state government may charge a green cess in terms of paise per unit to commercial and industrial consumers, which will amount to the collection of reasonably good fund per year, based on the present energy consumption in the state. Maharashtra has introduced the concept in India and presently charges a green cess of 8 paise per unit of electricity consumed by commercial and industrial consumers, leading to a collection of around Rs 450 crore in the last few years.

iii. Processing fees: As regards service charges, WBREDA presently doesn't have procedure to charge any the processing fees for projects. Although, WBGEDCL is the agency which is dealing with private developers, WBREDA can charge some processing fee for the services they render for off-grid projects.

iv. State budget-Plan: At present, the state government has been supporting RE programmes through some budgetary allocation. To make the state a front runner in this field, it is necessary to continue with sufficient budgetary support. This could be possible for WBREDA to request the state government for giving sufficient fund for the development of off-grid RE programmes in the state.

v. State budget (non-plan): At present, the state government provides support to the SNA for expenditures under the non-plan budget. Having a financially strong and self-sustainable SNA is in the interest of the state government. The Energy Department, Government of West Bengal, needs to provide sufficient fund which is required to meet all the expenses for salaries, wages and establishment.

vi. Central budget: In general it is observed that the central government (MNRE) has many programmes and schemes with the provision of large funds, which are not being fully utilised by the SNA. WBREDA must make concerted effort and prepare a focused plan to utilise central government funds to the maximum.WBREDA can try to maximise the fund available from National Clean Energy Fund (NCEF) for promotion of different solar programmes. WBREDA has not participated in the solar pump programme where capital subsidy for the solar pump was available from NCEF. Similarly from NCEF capital subsidy for solar power projects was available for the projects to be routed through SNAs.

- WBREDA can implement MIS system in the organization. For smooth and effective functioning of the organisation, MIS can be introduced in the SNA.
- WBREDA may prepare a document clearly specifying the rules and responsibility of the respective staffs. This will be useful for smooth functioning of the organisation and clear ambiguity, if any, in the respective role and responsibility of the staff.

ENCLOUSERS

SHORT TERM INTERVENTIONS PROPOSED TO BE IMPLEMENTED 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 compliant 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 solves the problem. In this way, online grievance redressal system satisfies the end users / customers by resolving their complaints and updating them with the compliant 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 compliant 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.

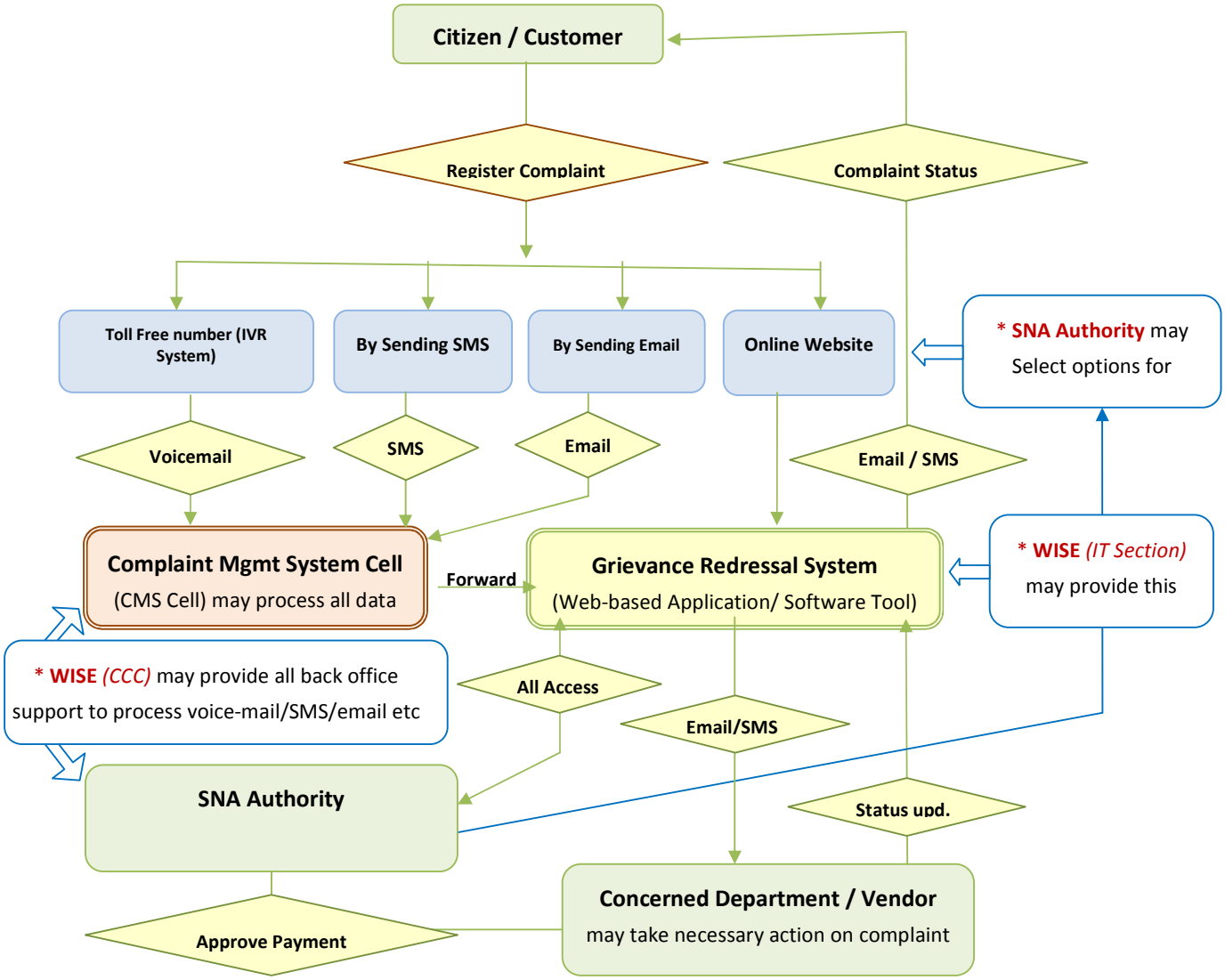


Figure **3** Data Flow Diagram

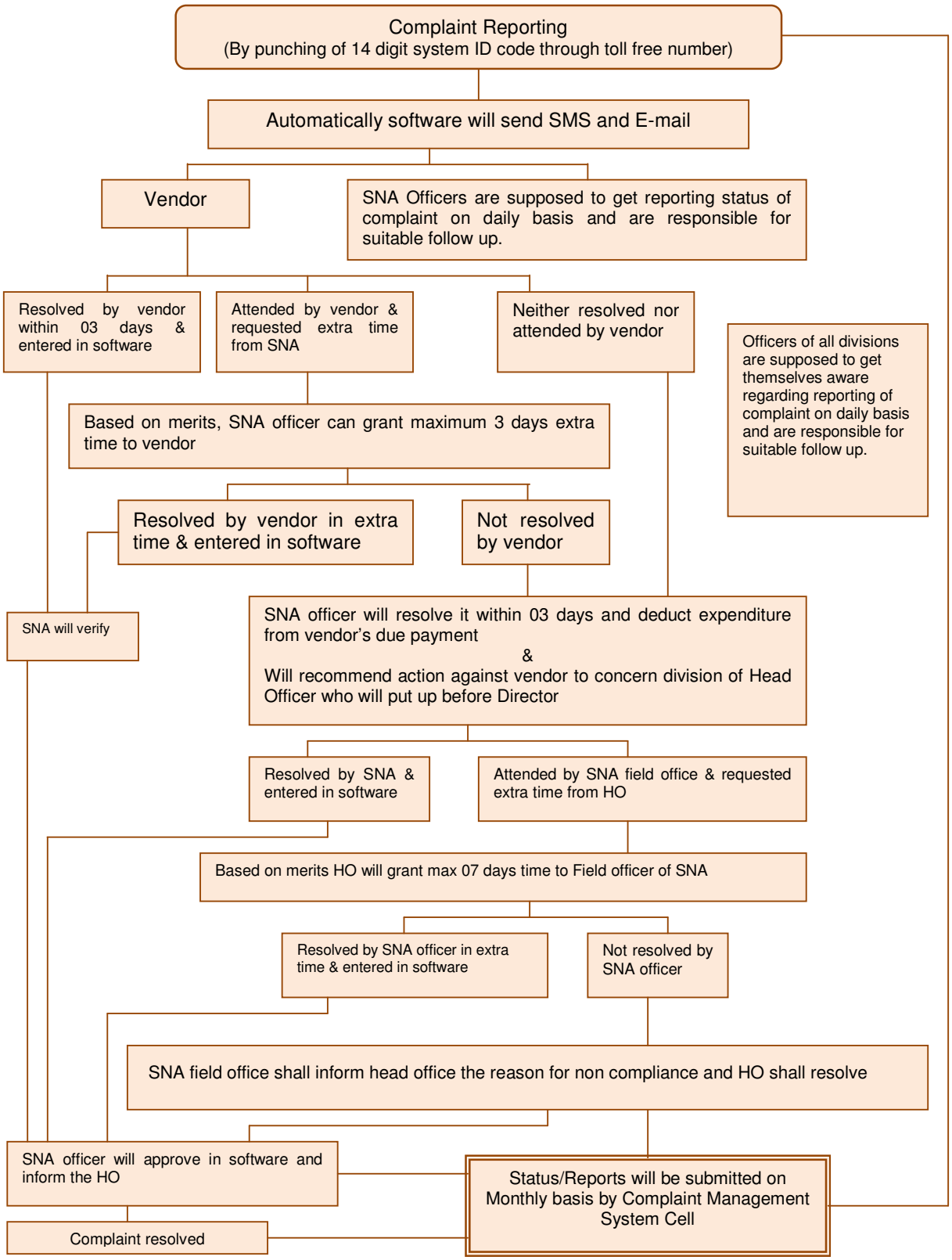


Figure **4** System Flow Chart: Web based Grievance Redressal System / Management Information System)

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 consult 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 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, CONTENT OF COURSE MATERIAL AND A MANUAL FOR CONDUCTING O&M OF SOLAR PV BASED OFF-GRID SYSTEMS / APPLICATIONS IN THE FIELD

i. Capacity building of field staff (technicians/ supervisors) 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 West Bengal and Jharkhand – Kolkata / Ranchi

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 states of Uttar Pradesh, Bihar, Jharkhand and West Bengal have 150,108, 18 and 6 numbers of filed level technicians / operators/ supervisors 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 schedule 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)

Time	*Content*	*Speaker*
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 —

	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 —

	Session 7: 1430 hrs to 1600 hrs
1430–1600	Monitoring of existing PV system

Tea: 1600 hrs to 1615 hrs —

	Session 8: 1615 hrs to 1745 hrs
1615–1745	Measuring Module output

	Valedictory Session: 1745 hrs to 1800 hrs
1745–1800	Feedback Valedictory

Draft Program schedule for 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

Time	*Content*	*Speaker*
0930–1000	Registration	
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1025-1030	Self Introduction of the participants	
	Tea: 1030 hrs to 1045 hrs	—
	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	—
	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	—
	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	