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*National Bank
Staff College,
Lucknow
(NBSC)*

'Shaping Minds to Excel'



**GRAMIN VIKAS -
EK KHOJ**

Vision of NBSC

To ignite, equip and sharpen minds to excel and enable recognition of NABARD as a knowledge driven development Bank of the nation.

राष्ट्र के “ज्ञान परक विकास बैंक” के रूप में नाबार्ड की पहचान की सुदृढ़ रखने हेतु मस्तिस्क को उत्कृष्ट, ऊर्जावान और कुशाग्र बनाना।

Mission of NBSC

Driving competency of officers towards excellence in performance through quality training and research in collaboration with professionals and institutes with domain expertise, on-line access to knowledge, interchange of innovative ideas and field experiences, in Hi-tech environment and empowering them to lead rural prosperity.

ग्रामीण समृद्धि का मार्ग प्रशस्त करने लिए, संबन्धित क्षेत्रों के दक्ष विशेषज्ञों और संस्थानों के सहयोग से गुणवत्तायुक्त प्रशिक्षण एवं अधय्यन, ज्ञान की ऑन-लाइन उपलब्धता एवं विचारों और अनुभवों के आदान प्रदान के माध्यम से हाई-टेक वातावरण में, अधिकारियों के सामर्थ्य को बढ़ाना।

From Editor-in-Chief's pen



This sixth issue of NBSC e-Journal is a culmination of the various studies conducted by the Faculty Members of NBSC and BIRD, Lucknow. The current issue covers the major findings/recommendations emanating from three studies undertaken by the Faculty Members on varied areas like (i) Climate Proofing of Watershed Project villages (ii) Online Training (iii) Solar Roof Top Unit at BIRD.

The views expressed in the articles are those of contributors and neither NABARD nor NBSC are responsible for them.

I express my sincere thanks to BIRD Lucknow, for making contributions to the current issue and once again take this opportunity to request Faculty Members of Training Institutions of NABARD and Officers of NABARD to contribute articles, study briefs for subsequent issues of the journal and make this endeavour of NBSC a success.



S K. Dora

**Principal/Chief General Manager
National Bank Staff College
Lucknow**

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Study on Climate Proofing of Watershed Project villages in Tamil Nadu

Shri N. Vikraman and Shri. B. Satish Rao¹

A Study on Climate Proofing of Watershed Project villages in Tamil Nadu was undertaken during February 2020 by S/shri B Satish Rao and N Vikraman, Faculty Members, NBSC, Lucknow. The study was conducted in Kancheepuram and Dindigul districts of Tamil Nadu which is one of the eight States where NABARD is implementing the climate proofing of watershed project villages under WDF. The objective of the Study was to identify various factors contributing to the successful implementation of the climate proofing of watershed project, sustainability of the project measures, functioning of CBOs such as VWCs, CIGs, etc., in the watershed project villages, assess the Financial Rate of Return based on the total investment made and total income accrued in the project areas, etc. and provide policy briefs for scaling up the project.

Some of the salient study findings are as follows:

1. The vulnerability of the watershed community in general and marginal community in particular has been reduced even during drought years due to selection of appropriate soil and water conservation measures, development of pastures, adoption of silvi-pasture models, fodder cultivation and taking up allied agriculture activities for livelihood. Various interventions such as soil testing, introduction of soil health cards, deep ploughing and summer ploughing, application of organic fertilizers, farm yard manure, vermicomposting, etc., have improved soil health and also reduced the production cost to the farmers. Crop diversification, inter cropping and crop rotation have helped the farmers to reduce the risk taking into consideration the reduction in the water availability and poor soil health conditions. The introduction of resource centres/ agri-clinics, seed farms, common equipment

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and agro-input centres, village knowledge centres, fodder banks and also linkages with IMD weather stations and advisory services, awareness on crop and cattle insurance have contributed to the improved resilience of the watershed communities to climate change risks.

2. An economic analysis of investments in the watershed projects and the gross benefit indicates that the Benefit-Cost ratio was more in case of those watersheds projects that have adopted crop diversification, i.e., cultivation of cash crops (floriculture and vegetables). The financial benefit to the individual farmers from the project was substantial as the project had invested in basic infrastructure for soil & water conservation. The incremental income was observed to be low in case of farmers who had cultivated millets and the incremental income was high in case of farmers who had diversified into vegetables and cultivation of flowers like Jasmine, Marigold, etc. A well-diversified agriculture with floriculture and vegetable cultivation had ensured large scale farming activities leading to agricultural employment throughout the year which had accelerated the demand for bank credit in the project villages.

Study Recommendations:

Based on the study, some of the recommendations made are as follows:

1. Include more structures for water recharge of ground water which will address the issue of parity and equity in accessing water resources.
2. While selecting projects for climate proofing, importance may be given to villages having low to medium ranges in slope (5-20% slope) so that maximum recharge will take place in the upper reaches of project villages.
3. While selecting the interventions, there is a need to give top most priority for improving the soil fertility through green manuring, silt application, mulching, use of organic manures, etc.
4. Project interventions may also include specific measures like construction of recharge pit, farm pond, etc., to revitalise the existing wells which will help the marginal and small farmers.
5. In order to improve nutritional security, there is a need to include minor millets and pulses in all the climate proofing projects to provide nutritional security to the community.

6. As silt application helps to improve the fertility of the soil, these should be included in all climate proofing projects. Also deep ploughing and summer ploughing which are best measures for *in situ* water harvesting and pest management should be included in all the climate proofing projects.
7. Intercropping should be made mandatory in all the projects to reduce risk.
8. As crop rotation reduces the pest infestation and improves soil fertility, farmers may be given specific training on crop rotation (especially when they are cultivating cash crops).
9. Kitchen garden component should be included as a core component in all the climate proofing projects.
10. There should be a component for 'Demonstration', while introducing new crops and new agricultural systems.
11. Depending on the population of vulnerable community, the Revolving Fund Assistance (RFA) should be proportionately increased to cover maximum members, within the project period.
12. In new projects, while selecting interventions, priority may have to be given to small and marginal farmers located in the upper reaches of the watershed to reduce the vulnerability.
13. There should be a concept of Social audit to be done on an annual basis so that the utility of the structures are documented and known to all stakeholders.
14. There is a need to give training to VWC on Post-project management which will help in maintaining the infrastructure created out of the project.
15. Each VWC member may be given specific task so that the implementation will be smooth and help in timely completion of the project.
16. There is a need to form federation of SHGs so that better benefit may be availed by pooling of resources in case of income generating activities.
17. As CIGs/JLGs play major role in economic development, there should be specific target for formation of CIGs/ JLGs under the project and subsequently these groups need to be brought under FPO for aggregation and value addition. Formation of FPO should be mandatory in all the projects for long term sustainability of initiatives. There is a need to dovetail Custom Hiring of Farm Machinery scheme of the State Government in all the project villages. Wherever available, insurance schemes should be popularised in all project villages.

18. There should be close liaison between Agriculture University and Project Facilitation Agency for dissemination of weather advisories to the farmers in the project villages.
19. There is a need to share knowledge at the State level and the same should be done by Regional Office of NABARD on an annual basis. There is a need for a separate budget for dissemination of Success stories with similar stakeholders within the State.

Study on Online Training conducted through Cisco WebEx

Shri Shankar Doraiswamy²

COVID 19 Pandemic, a black swan event, threw the biggest challenge for Training Establishments of NABARD in the month of March 2020 due to restrictions on movement of officers and staff members of NABARD and its client institutions. During lockdown, NABARD and the rural banks adopted Work from Home (WFH) with skeletal office staff to ensure provision of essential services and business continuity. On-site training came to a grinding halt at NBSC and BIRD at Lucknow, Mangalore and Kolkata. However, WFH also provided an opportunity for the TEs to adopt online training mode to ensure continuous and constant skill and knowledge upgradation of our officers and staff members of our client banks. Accordingly, to meet the challenges thrown by COVID 19, NBSC quickly realigned its training pedagogy and migrated to the distant learning paradigm in training delivery. It piloted a pioneering on-line training programme during 21-22 April 2020 using CISCO WebEx Platform with the help of DIT HO Mumbai. This pilot initiative was a huge success and paved the way for using the WebEx platform for conduct of full-fledged Web based training programmes in future by realigning and redesigning the existing training programmes at NBSC. Other TEs of NABARD with the help of DIT HO Mumbai also adopted the CISCO WebEx platform for their online training needs.

Objective of the Study: After conducting about 19 training programmes covering 458 officers of NABARD, NBSC took up a quick online study to evaluate the on-line conduct of programme using the WebEx platform and come out with suggestions for improvements to optimise learning.

Methodology and sample size of the Study: A questionnaire was specially designed encompassing both technical and behavioural parameters relating to conduct of online study. The questionnaire was administered online. Links to Microsoft forms were shared with 450 officers who had attended the 19 online training

² The Author is Dy. General Manager/FM, NBSC. The views expressed are of the author and do not necessarily reflect the views of NBSC or NABARD.

programmes conducted by NBSC. Out of the 450 officers, 142 officers (31.5%) responded within the stipulated time period. Further, a modified questionnaire was also developed and administered to 47 FMs belonging to all TEs of NABARD and out of these 28 FMs (60%) responded.

Major findings of the study:

- a. **Training areas:** While 53% of the officers have attended training programmes related to their respective desk, 27% of trainees have attended desk neutral training programmes
- b. **Demand based training:** Of the total respondents, 44% attended training program as indicated in their respective TNAs and 26 % attended training programs which were mandatory (e.g. programme for DRs, and Retiring officers, etc.) .
- c. **Training of young officers:** 63% of the trained officers had put in less than 5 years of service in NABARD. Only 29 % of the officers trained were having more than 15 year(s) work experience in NABARD.
- d. **Area wise training imparted:** 26% of respondents were from Development depts., 23 % from Administration, 18 % from Business depts. and 16% from officers working in multiple depts. followed by 14% from DoS.
- e. **Gender disaggregated training:** Only 19.5% of the trainee officers were women.
- f. **Preference for training from home:** An overwhelming 82% of the trainee respondents found it more convenient to attend the online training program from home.
- g. **Separate training cell:** The respondents also indicated the need for creation of separate training cell in the respective offices with Laptops and dedicated internet connection.
- h. **Internet connectivity:** Majority of the trainees & FMs respondents indicated that there is a need for upgradation of internet connection at all our offices and HO Depts. for enhancing the overall effectiveness of online training platform.
- i. **Laptops for online training :** Majority of the respondents indicated that Laptops may be provided to the trainees for attending the online training programmes

- j. **Ease of online training:** Majority of the respondents were comfortable with online training programme
- k. **Optimal duration of training programmes and sessions:** On-line Training Programme should ideally be for 2-3 days with 2-4 sessions per day and with a session duration of 45-60 minutes
- l. **Technology platform:** While 50% of trainee respondents preferred continuing with the current CISCO Webex Training Interface, remaining 50% suggested for change in technological platform. In case of FMs, more than 60% preferred continuing with CISCO Webex platform. Majority of the respondents felt that CISCO Webex interface should be more simple and easy and should function without glitches even with lower internet bandwidth
- m. **Challenges:** Poor internet, audio & video receptivity were some of the issues that were flagged by the respondents inhibiting the effectiveness of online training programmes
- n. **Pre-training requirements:** Many of the respondents indicated requirement of brief reading material, sharing of presentations before the commencement of the training programme.
- o. **Post-training requirement:** The sessions of a training programme should be recorded and shared with the participants.

Study Recommendations:

General:

- a. **Demand based training:** Officers nominated for training programmes should strictly be as per the TNA apart from those relating to mandatory programmes.
- b. **More training on business areas:** More number training programmes on existing and new business areas of NABARD may be conducted by NBSC. Similarly, more number of officers from business departments may be nominated for the existing programme. Further, more than 80% of FMs indicated that Business Related Training Programmes are preferable through Online Training Platform.
- c. **Nominating more number of women officers for training:** More number of women officers should be nominated for training programmes.

Technical:

- a. **Upgrading internet bandwidth:** Internet Connection should be upgraded by doubling the bandwidth currently available
- b. **Dedicated cabin for training:** Dedicated training cabin to be established in each of the offices for the benefit of trainees.
- c. **Provision of laptops in cabin:** The training cabin need to be provided with required number of laptops and dedicated internet connection
- d. **Compatibility of CISCO with low bandwidth:** CISCO WebEx should be made available to function in low internet bandwidth too.
- e. **Optimal duration of training:** On-line Training Programme can be for a maximum of 2-3 days with 2-4 sessions per day and session duration of 45-60 minutes
- f. **Videos and cased studies:** Training Programmes should include more videos and case studies
- g. **Blended learning:** The training programmes should be of both offline and online mode **separately**. Nearly 10% of the respondents have indicated requirement for blended learning in the same training programme.

Solar Roof Top Unit at BIRD - An Analysis

M K De, FM, M R Gopal, and Vineet Sudhir Bhat³

Introduction

Climate change has become the greatest threat to the mankind and its impact is being felt by all sections of the people across boundaries. With rapid increase in demand for power, dependence on fossil fuel is increasing at an alarming rate. Reduction in the dependence on fossil fuel for power generation is the need of the hour which can only be achieved by adopting low carbon energy. Among the renewable sources of energy, solar is more ubiquitous and a popular one and it has a major role to play in mitigation measures of climate change. In the [Paris Agreement](#), India has committed to a [Nationally Determined Contributions](#) (NDC) target of achieving 40% of its total electricity generation from non-fossil fuel sources by 2030.

The Ministry of New and Renewable Energy (MNRE), nodal ministry in India is playing a catalytic role in popularising renewable energy. Road map for solar power by 2022 envisages 100 GW of power from solar, of which, 20 GW would come from Solar Parks, 20 GW by units established by unemployed graduate youth, 20 GW from State level and remaining 40 GW is through Solar systems installed on rooftops of residential, commercial, institutional & industrial buildings. As per the estimate of MNRE, market potential for rooftop Solar Photovoltaic (SPV) is 124 GW. The MNRE has identified office premises of 19 Ministries including Ministry of Finance for installation of rooftop solar PV system and designated agency for implementation is Solar Energy Corporation of India (SECI), a company promoted by the MNRE.

Solar Photovoltaic: PV, the technology which converts sunlight directly into electricity, is among the fastest growing segments of the renewable energy industry. It is already well established in many countries including India. Some of the factors driving the growth of this segment are: concerns towards carbon emissions, energy security and the rising prices of fossil fuels.

2. Grid connected roof top solar PV System: In recent years solar PV systems became viable and attractive. Utility scale plants are being set up worldwide with promotional mechanisms which are set up on ground surface. Available roof-top area on the buildings can also be used for setting up solar PV power plants and thus dispensing with the requirement of free land area. The electricity generated from SPV systems can also be fed to the distribution or transmission grid after conditioning to suit grid integration.

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3. Advantages of Roof Top System

- Savings in transmission and distribution losses
- Low gestation time
- No requirement of additional land
- Improvement of tail-end grid voltages and reduction in system congestion with higher self-consumption of solar electricity
- Local employment generation
- Reduction of power bill by supplying surplus electricity to local electricity supplier
- Battery elimination makes easy installation and reduced cost of system

4. Models:

Two models developed by MNRE to encourage private participation and also private public partnership in the renewable sectors are:

4.1. RESCO model: Under RESCO (Renewable Energy Service Company) model, the building owner is not required to do upfront investment in rooftop solar asset. All the Operation and Maintenance cost will be borne by RESCO at no extra cost. The Consumers will have to sign a power purchase agreement (PPA) with the RESCO at pre-determined tariff discovered through competitive bidding process and access to the building area for setting up the unit and maintenance for life of the project as decided in the MoU. The asset created will be transferred to the building owner after pre-determined date.

4.2. CAPEX model: Under this model, building owner will enter into an Engineering Procurement and Construction Agreement (EPCA) with the vendors and will also incur the expenditure for installation of the systems at the SECI tendered rates. The vendor will provide warranty for 5 years during which period the operation and maintenance will be also be undertaken by the vendor. Thereafter, the future maintenance of the system will have to be undertaken by the building owner.

SECI has identified the vendors for each state through a national bidding process and finalised the levelised tariff under Renewable Energy Service Company (RESCO) model and system cost per kWp for Capital Expenditure (CAPEX) model. SECI will provide the technical guidance in setting up of rooftop solar PV projects under RESCO and CAPEX models through their short listed vendors / power producers for each state under government incentive scheme.

5. NABARD's Initiatives in Installation of Solar Rooftop PV Systems:

As part of the initiatives, NABARD has entered into a Memorandum of Understanding (MoU) with Solar Energy Corporation of India Ltd (SECI) under MNRE, GoI to facilitate setting up of rooftop solar PV system on the premises at various locations across the country. The MoU was signed on 12 Feb. 2018.

As part of the MoU, NABARD HO had begun process by installation of solar PV system under RESCO model in their training establishments at NBSC, BIRD, lucknow BIRD, Mangalore and Regional Office Chennai. Bankers Institute of Rural Development, Lucknow (BIRD), is an institution set up by NABARD for training and research activities in the field of agriculture and rural development banking for Officers of Government, Banks, Voluntary agencies etc. The institute is located in a lush green campus spread over an area of 42 acres with buildings for the administrative block, hostel rooms, library and auditorium, and residential quarters.

Out of the 10 bidders under RESCO model in Uttar Pradesh, M/s Cleanmax Enviro Energy Solution Pvt. Ltd was shortlisted with tariff per kWp of ₹ 3.839.

To take advantage of the rooftop area available in the campus, BIRD has taken the initiative in installing roof top solar PV system under the NABARD’s MOU referred above. Based on the suitability of the rooftop sites for optimal generation, rooftop area of 1307 sq.m was selected and the solar PV system was installed. The system was inaugurated on 13 Oct 2018 and was synchronised with grid on 17 Oct. 2018.

Location	Capacity (kWp)	No. PV panels (No.)
Multipurpose Hall	19.50	60
Hostel (Blocks J,H & F)	26.00	80
Admn. & Library Building	63.37	195
Total	108.87	335



Pic. PV panel in Administrative & Library Building of BIRD

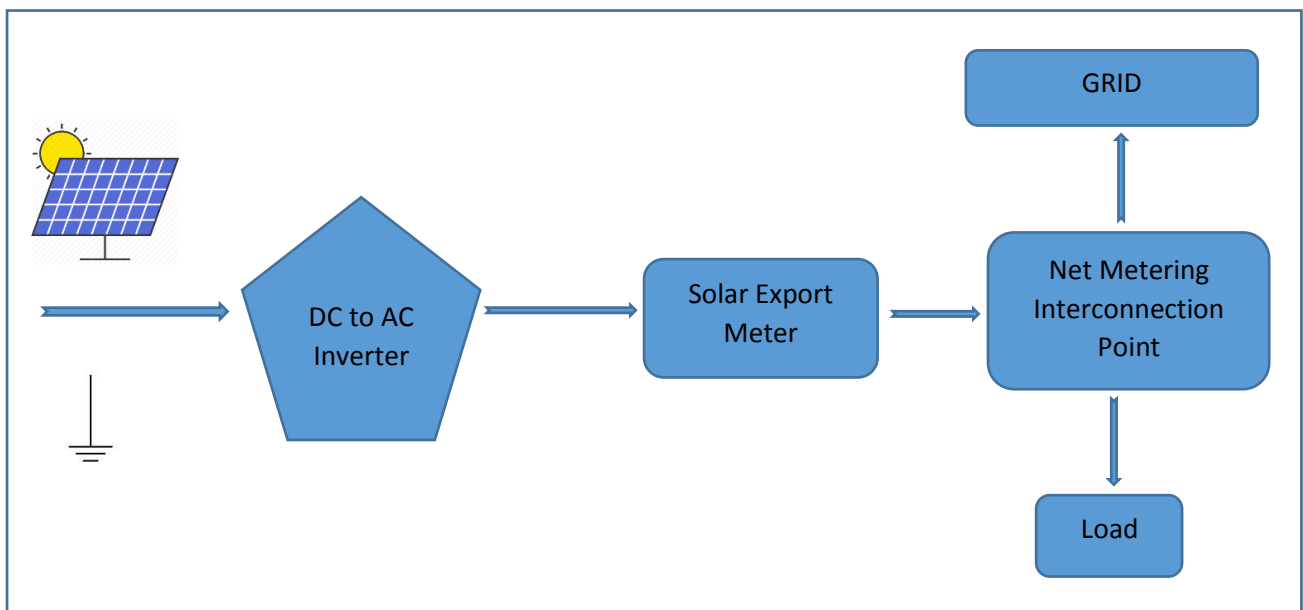
6. Technical Specifications

- ✓ Total foundations built is 96
- ✓ Total solar panels installed is 335
- ✓ Total Inverters installed is 4
- ✓ Expected monthly power generation is 12,000 units (approx.)
- ✓ Time period of contract is 25 years.



7. Financial Parameters:

- ✓ Tariff to be paid to the M/s Cleanmax is ₹ 3.839 / unit
- ✓ Current DISCOM rates is ₹ 8.35 per unit (as per the then tariff calculated by the agency without fixed charges)
- ✓ Savings per unit is ₹ 4.511 / unit
- ✓ Average monthly financial savings is ₹ 50,000 (approx.)



Pic. Flow Diagram of the Solar PV System

8. Net Metering:

Net metering is an arrangement for measurement of electrical energy in a solar power system under which rooftop solar PV system installed at the consumer end and exports surplus electricity, if any, to the Grid after off-setting the electricity supplied by Distribution Licensee during the applicable billing period. Under the grid connected roof-top solar PV power project, solar panels generate DC power which is fed to Power Conditioning Unit (Inverter) where DC power is converted into AC power. When solar radiation is available, power is generated and fed to captive load and excess power, if any, is exported to the grid. Such grid connected solar power systems are capable of generating solar power so long as grid connectivity is operational. When solar radiation is not enough to meet the captive load, required excess power is drawn from the grid. Net metering is the mechanism to measure the amount of power drawn from the grid. An appropriate energy meter capable of recording both import and export of electricity is used in the net metering system.



Pic. Control unit of Solar PV System

Net metering system ensures financial savings for the captive loads in terms of lesser power consumption by effective and efficient use of available captive solar power generated where grid connectivity is used as battery for storing excess power generated and using that power when load is more. Net metering also reduces stress on the local distribution system by creating a smoother demand curve for electricity and better demand side management.

9. Energy production by the PV units:

The unit was synchronised with grid on 17 Oct. 2018 and monthly bill paid to the M/s Cleanmax Enviro Energy Solution Pvt. Ltd. by NABARD based on the meter reading jointly done by BIRD and the RESCO company. The energy produced and the amount of bill paid by BIRD is analysed in the following table.

Table. Month-wise energy produced and financial saving

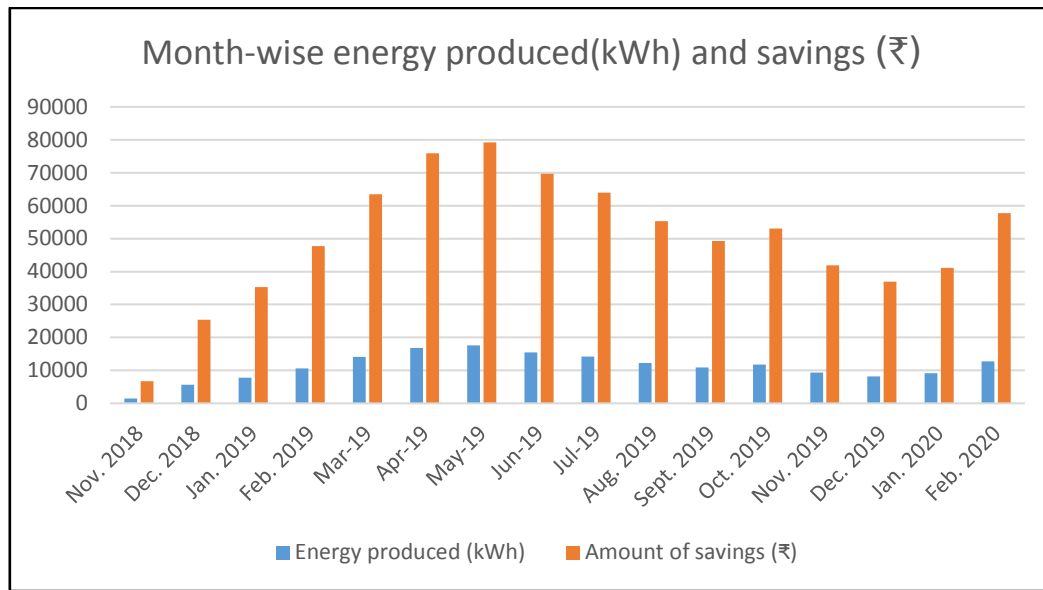
Sl. No.	Month	Energy produced (kWh)	Amount of bill paid to the vendor (₹)	Amount of savings (₹)
1	Feb. 2020	12,794.13	49,147	57,714
2	Jan. 2020	9,114.05	34,989	41,113
3	Dec. 2019	8,200.28	31,481	36,991
4	Nov. 2019	9,298.82	35,698	41,947
5	Oct. 2019	11,770.32	45,186	53,096
6	Sept. 2019	10,934.97	41,976	49,328
7	Aug. 2019	12,258.18	47,059	55,297
8	July 2019	14,171.18	54,399	63,926
9	June 2019	15,456.00	59,336	69,722
10	May 2019	17,561.79	67,420	79,221
11	April 2019	16,836.13	64,634	75,948
12	March 2019	14,062.59	53,986	63,436
13	Feb. 2019	10,589.45	40,653	47,769
14	Jan. 2019	7,813.33	29,995	35,246
15	Dec. 2018	5,634.89	21,632	25,419
16	Nov. 2018	1,498.72	5,750	6,761
		1,77,994.83	6,83,341	8,02,934

The total savings during last 16 months is to the tune of ₹ 8.03 lakh with average monthly savings of ₹ 50,000. Taking the total life of the project of 25 years, the total savings for NABARD is estimated to be ₹ 155.00 lakh. In addition, the entire infrastructure created in the RESCO model will be transferred to the NABARD.

Ready calculator (SPIN) of energy generated and financial savings is given in the MNRE website (www.solarrooftop.gov.in/rooftop_calculator) where inputs required are rooftop area or capacity of the solar PV panels. Our assessment of saving roughly corresponds to the estimates of ready calculator of MNRE.

On analysis of the quantity of energy production, the 03 units put together produced 1.78 lakh kWh of power during last 16 months. As may be observed from the above, the production of power is maximum during summer months with peak in the month of May 2019. The production of power during the April, May and June 2019 was 49,853 kWh.

Figure. Month-wise energy produced and financial saving made by NABARD



10. Other benefits:

There is no operating risk involved in terms of equipment failure or lower power generation as purchaser pays only the per kWh power generated. BIRD being training institute of repute, there is a foot fall of around 10,000 delegates in the campus. The Institute thus has a great potential to create awareness about the power of solar energy and motivates other institutions to adopt the model. The installation of the unit also enhances the relevance of the Centre for Climate Change that was setup in BIRD in the year 2018. The unit can be showcased to the participants both under climate change programme and for other programmes for popularising renewable energy amongst bankers.

Moreover, Solar panel will deflect solar radiation from the roof, reducing ambient room temperature and /or AC power consumption.

As per, “CO₂ Baseline Database for the Indian Power Sector – User Guide (June 2018)” by Central Electricity Authority, Ministry of Power, Govt. of India conventional coal-fired power plants emit 980 g of CO₂ for every kilowatt-hour of electricity. Similarly, every kilowatt-hour of electricity generated, a solar PV system emits between 60 and 150 g of CO₂ (www.planete-energies.com). Taking these factors into consideration, we can assume that 900 g of CO₂ generation can be avoided by installation of PV systems. The back of the envelop calculation estimates that CO₂ emission reduction is to the extent of 160 tons per year.

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