F. No. 32/645/2017-SPV Division
Government of India
Ministry of New and Renewable Energy
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Block-14, CGO Complex,
Lodhi Road, New Delhi
Dated: 8 November 2019

Office Memorandum

Subject: Guidelines for implementation of Component-C of PM-KUSUM Scheme on Solarization of Grid-connected Agricultural Pumps.

This refers Ministry's OM of even number dated 22.7.2019 vide which Guidelines for implementation of Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan (PM-KUSUM) Scheme were issued.

2. Para (5) of III (a) at page 15 of the aforementioned Guidelines, regarding implementation of Component-C, provides that Central PSUs or State Implementing Agencies will carry out tendering process as per the Guidelines, standards and specifications issued by MNRE. Accordingly, detailed Guidelines including applicable standards and specifications, attached at Annexure, are being issued aiming towards smooth implementation of Component-C.

3. This issues with the approval of Competent Authority.

Enclosed: As above.

8/11/19
(J K Jethani)
Scientist-E

To
All Concern

Annexure

Guidelines for implementation of Component-C of PM KUSUM Scheme on Solarization of Grid-connected Agricultural Pumps

1. Background

Approval of Pradhan Mantri Urja Suraksha evam Utthaan Mahabhiyaan (PM KUSUM) Scheme was issued on 08 March 2019. Under Component – C of the Scheme 10 Lakh Grid-connected Agriculture Pumps of individual pump capacity up to 7.5 HP are targeted to be solarised by 2022. As per provisions of the Scheme initially one lakh of grid connected agriculture pumps will be solarised on Pilot basis and further scale-up will be after evaluation of pilot mode.

Component-C of PM KUSUM Scheme is a new initiative from the Government of India aimed at ensuring reliable day time power supply for irrigation, reducing subsidy burden on Discoms and providing additional sources of income to the farmers.

Under this Component, individual farmer having grid connected agriculture pump will be supported to solarise pump. Solar PV capacity up to two times of pump capacity in kW is allowed under the scheme, so that the farmer will be able to use the generated solar power to meet the irrigation needs and get additional income by selling surplus solar power to DISCOMs. Water User Associations and community/cluster based irrigation system will also be covered under this component. The States of AP, Gujarat and Karnataka in recent past implemented pilot projects to test the technology and possible modes of operations for solarisation of agriculture pumps. The brief on these pilot projects are given below:

In the State of Andhra Pradesh, APEPDCL is implementing a pilot project wherein all inefficient AC pump-sets on a feeder have been replaced with solar BLDC pump-sets as per MNRE specifications for stand-alone solar water pumps along with 5 year insurance and warranty. Power generated through the solar panels is fed to the BLDC pump and when the pump is not in operation the solar power is exported to the grid through grid tied inverter. Incentive is available to the participating farmers at the rate of Rs. 1.50/kWh for net injection.

Government of Karnataka had also launched Surya Raitha Scheme for solarization of agricultural pumps. Under the Scheme, old inefficient pumps are replaced with new energy efficient pumps. Two-third of the electricity generated through solar panels is to be mandatorily used by farmers and the balance energy can be sold to the Discom at a proposed rate of Rs. 7.50 / kWh.

Under Suryashakti Kisan Yojana (SKY) launched by Government of Gujarat, PV capacity (in kW) of 1.25 times the pump capacity in HP is allowed to be installed for connection on feeders where normally 70% of the farmers connected on the feeder agree to participate in the Scheme. The scheme allows the Discom to remotely connect or disconnect pumps on a particular feeder to regulate eight hour power supply to non-participating agriculture consumers. Discom purchases the surplus power generated at a rate of Rs. 3.50 per unit and an equal amount of Evacuation Based Incentive is provided to the farmer for seven years to be adjusted against the annual installment for loan portion. Commercial settlement is done based on net of electricity drawn and injected, which is recorded through three meters (Solar generation, pump consumption and import/export from grid) arrangement to get correct reading even in case any of the three meters is faulty. Watch Dog Devise/ Watch dog Transformers are installed to restrict and control the 3-ph power supply hours for non-participating farmers on the feeder. SKY scheme has introduced Software based remote metering of all consumers and prosumers

to avoid metering error and metering/billing loss due to manual intervention. Remote monitoring of three meters of Agriculture consumers and other consumers on the feeders is being through Solar Energy Data Management System (SEDM). Distribution loss more than 5% on the feeder is distributed among the solar prosumers on pro-rata of sum of their injected and drawn energy on the feeder. This mechanism enable control over possible irregularities on the feeder.

Guidelines for implementation of PM KUSUM Scheme issued on 22.07.2019 provides that Central PSUs or State Implementing Agencies (IAs) will carry out tendering process as per the Guidelines, standards and specifications issued by MNRE for Component-C. Accordingly, these guidelines are being issued aiming towards smooth implementation of Component-C.

2. Options for solarisation

There could be following options for solarisation of agricultural pumps:-

i. **Option-1 (Net-metering):** In this case the agriculture pump will continue to run at rated capacity taking power from solar panels and balance power from grid, if required, and in case solar power generation is higher than required by pump, the additional solar power would be fed to the grid. Farmer would be able to import and export power to the grid at the rate specified by the concerned State Government/SERC.

   In this case, since the feeder will be kept 'ON' during the sunshine hours from morning to evening, there is a possibility that the farmer may run the pump during the peak hours drawing power from the grid and feeding surplus solar power during the off-peak hours. This situation may not be desirable from the Discom's perspective due to price differential between peak hours and off-peak hours. To overcome this situation, Discom may introduce different drawl and injection tariff rates so that farmers are discouraged to draw power from the grid. Further, Time of Day (ToD) tariff is also an alternative to efficiently manage demand and supply on the solarised feeders.

ii. **Option-2 (Pump to run on solar power only):** In this case the pump will only run on the solar power as in case of stand-alone solar pump and no power will be drawn from the grid for the operation of pump. The existing motor pump set will have to be replaced with AC/DC solar water pumping system as per MNRE specification for standalone solar pump and when the pump is not running the solar power can be fed in to the grid through suitable grid-tied inverter.

   The total solar PV capacity including additionally allowed under the Scheme can be bifurcated into two portions, one portion of SPV capacity as per MNRE specifications required for the standalone solar pumps of given HP capacity, which will either run the pump or feed power to the grid when the pump is not running; and other portion of SPV capacity out of the total allowed by the State will continuously feed power to the grid during sunshine hours.

Based on the experiences from the pilot projects conducted by States, the IAs may choose either or a combination of options given above during the pilot phase. State can also devise their own system other than the options given above and implement the same during the pilot phase.

The Central Government will provide Central Financial Assistance (CFA) up to 30% of the cost of solarisation of the pump for solar PV component including solar modules, module

mounting structure, controller/inverter, balance of system, installation & commissioning, five year CMC, insurance, etc., on basis of benchmark cost or cost discovered through tender whichever is less.

Solar PV capacity up to two times of pump capacity in kW is allowed under the scheme. However, State may specify lower solar PV capacity in kWp, which in any case shall be not be less than pump capacity in HP e.g. for 5 HP pump, the solar PV capacity allowed should not be less than 5 kWp and may go up to 7.5 kWp (1 HP ~ 0.75 kW).

Further, the CFA will be provided for solarisation of pumps up to 7.5 HP. Solarisation of Pumps of capacity higher than 7.5 HP is also allowed, however, the CFA in such cases would be limited to the CFA applicable for pump of 7.5 HP in the respective State/UTs.

3. Selection of Feeders and load survey

Feeder-wise implementation is to be carried out under this component for solarisation of grid-connected agricultural pumps. Feeders may be selected on the basis of load, technical and commercial losses, number of consumers, etc. Efforts should be made to solarise all agriculture pumps in a feeder, however, IAs may impose a minimum solarisation requirement for a feeder in terms of minimum % of pumps solarized on that feeder.

GPS Survey should be carried out on eligible feeders to correct feeder coding and ensure accurate feeder loads and distribution loss calculations.

Farmers may be given option to declare his actual connected load or alternatively the IAs may carry out survey to get details on actually connected load so that solar PV panels of required capacity is provided to the participating farmers. IAs may also assess the actual requirement of pump capacity based on water requirement and water table

4. Tariff and Energy Accounting and Payments

Depending upon the model adopted, the DISCOM will purchase solar power from the farmer at the rate decided by the respective State/SERC. Component-C of the PM KUSUM Scheme will be implemented on pilot basis, therefore, the IAs may workout innovative technical and financial models and test them during the pilot phase.

Distribution losses for the selected feeder may be accounted and internalised in the financial settlement through an appropriate system worked out in consultation with the concerned SERC for e.g. under SKY Scheme the losses are socialised on the concerned feeder.

Smart meters having facility of sending data on real time basis shall be deployed. The IA may choose appropriate metering arrangement to get proper energy accounting at each consumer level and feeder level and avoiding possibility of any malpractice.

5. Implementation arrangement and tendering

Once the feeders are identified and implementation model is selected the IA will conduct information and awareness campaign for the farmers to share the details of the scheme and educate them about the implementation model and benefits of participation in the scheme. Banks/FIs may also be part of this campaign to provide the loan facilities against the required farmer share. Feeder wise committee of farmers may be formed, which will coordinate amongst the participating members and other agencies involved in implementation of the Scheme.

IA shall invite bids for empanelment of Vendors through transparent bidding process. Empanelment may be state-wide or feeder-wide, as per decision of the state. To ensure quality and post installation services, only manufacturers of solar panels or manufacturers of solar

water pump would be allowed to participate in the bidding process. Preferably single vendor may be given responsibility of a feeder to ensure better services and accountability.

In case a State chooses to install additional devices for management of feeders, e.g. watchdog transformers and devices deployed under SKY Scheme, tender for the same may be conducted separately as the financial requirement to this end shall be met from the State funds.

Real time monitoring is an important aspect in implementation of the component-C and therefore, a separate vendor having expertise in metering, communication and designing the required software for monitoring including getting data through different communication service providers, processing of data using analytical tools, generating reports for monitoring and MIS, etc., may be selected.

6. System Specifications

MNRE has already issued updated specifications for stand-alone solar water pumping system vide circular dated 17.7.2019(as amended from time to time), these specifications also cover specifications for solar modules, MMS and other balance of system. The same shall be adopted as minimum system specifications for solarisation of grid connected agriculture pumps. For grid-tied inverters, applicable BIS/MNRE specifications shall be followed. Protection equipment including surge protection devise, lightning arrestors, earthing, MCB/MCCB/RCCB, etc., shall be provided as per standard industry practice.

It will be mandatory to use indigenously manufactured solar panels with indigenous solar cells and modules. Further, motor-pump-sets, inverter/controllers and balance of system should also be manufactured indigenously. The vendor has to declare the list of imported components used manufacturing of equipment used in the solarisation system.

7. Quality, Efficiency and Maintenance

Systems installed under this Programme should meet technical specification and construction standards as specified by BIS and MNRE from time to time. Non-compliance will be taken seriously to the extent of blacklisting of the vendor, in the same manner as specified, apart from taking action under any other law in force. The vendors shall provide valid test certificates for equipment and system, which may be verified from the issuing agency, if required. To ensure the quality, inspection shall be carried out at factory level before despatch of major items e.g. solar modules, inverter/controller, MMS, etc., during the installation of system and final commissioning of the system. Officers involved in inspection should be domain experts, properly trained and equipped with necessary tools for inspection. An inspection manual and reporting formats with check list may be developed for this purpose. The IA may engage a third party inspection agency for this purpose.

Selected vendors shall be responsible for design, supply, installation and commissioning of adopted solarisation system for grid connected agriculture pumps. Vendors shall mandatorily provide AMC for a period of 5 years from the date of commissioning of the system including insurance coverage for the installed system against natural calamities and theft. AMC will include inspection by Vendor at least once in a quarter and submission of quarterly inspection report of the installed system as per prescribed format. To ensure timely maintenance of the system the vendor shall have one authorized service centre in each operational district and a helpline in local language in each operational State. Helpline number shall be indicated on the inverter/controller at suitable location easily visible to the user. The vendor shall attend the complaint registered/informed and resolve the same within a specified timeline.

IA may specify a minimum guaranteed generation during a year from the solar system installed for a specified period and provision of compensation in case of not achieving the same.

Before installation, the implementation agency shall conduct survey of the existing pumps proposed to be solarised on the selected feeder. Efforts shall be made for replacement of inefficient pumps conventional AC pumps with five star rated efficient pumps to ensure optimum use of energy. Funds for pump replacement may be provided through applicable Central or State Government Schemes and/or farmers' contribution. State may also devise mechanism to provide bank loan to farmers for pump replacement.

Thorough maintenance of selected agriculture feeders is required to maintain feeder availability during sunshine hours. This includes maintenance of 33/11 kV sub-station, 33 kV, 11 kV and LT lines and distribution transformers, etc., on regular basis in a time bound manner. Proper protection system including improved earthing of equipment shall be provided considering possibility of high voltage/current due to multiple generating sources in the feeder selected for solarisation.

8. Monitoring

It will be mandatory for implementing agency to create remote monitoring system to monitor performance of the system post-installation. The remote monitoring system will consist of smart meters, communication hardware/ IoT devices, software interface, web and mobile application and internet connection.

State may choose to install watchdog transformer and devices to regulate power supply and monitor non-participating connections on the feeder concerned.

Implementing agencies will monitor installations through web applications and on field from the perspective of ensuring proper functioning of the systems and to aggregate and analyse data generated during the pilot phase which will help in scheme refinement in expansion phase.

MNRE will develop a central monitoring portal which will extract data from the State portals for monitoring of the scheme and analyse data generated, which will in turn be used in scheme refinement and taking measures to attract more farmers to the scheme and induce required behavioural changes.

9. Interpretation of the Guidelines

In case of any ambiguity in interpretation of any of the provisions of these guidelines, the decision of the Ministry shall be final.

The Guidelines would be reviewed by the Ministry from time to time and necessary modifications would be incorporated after getting approval of competent authority.

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