

PC - I FORM (Revised 2005)  
**PRODUCTION SECTORS**  
**(Agriculture Production)**

**PROMOTION OF HIGH VALUE AGRICULTURE THROUGH  
SOLARIZATION OF DRIP & SPRINKLER IRRIGATION  
SYSTEMS**

**(ADP Funded)**

<b>Project Cost:</b>	<b>Rs. 3,678.379 Million</b>
<b>Govt. Share:</b>	<b>Rs. 1,928.379 Million</b>
<b>Farmers' Contribution:</b>	<b>Rs. 1,750.000 Million</b>



**(2019-20 to 2021-22)**

**DIRECTORATE GENERAL AGRICULTURE  
(WATER MANAGEMENT) PUNJAB  
LAHORE**

**JULY, 2019**

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## ABBREVIATIONS

DGA(WM)	Director General Agriculture (Water Management)
PIPIP	Punjab Irrigated-Agriculture Productivity Improvement Project
OFWM	On Farm Water Management
SSC	Supply & Service Company
TPVM	Third Party Validation and Monitoring
M&E	Monitoring and Evaluation
P&DD	Planning and Development Department
HEIS	High Efficiency Irrigation System
PQC	Prequalification Committee
EIRR	Economic Internal Rate of Return
ADP	Annual Development Program
DDA (OFWM)	Deputy Director Agriculture (On Farm Water Management)
ADA (OFWM)	Assistant Director Agriculture (On Farm Water Management)
WMTI	Water Management Training Institute
PSC	Project Steering Committee
DIC	District Implementation Committee
CSC	Consultant Selection Committee
DA (OFWM)	Director Agriculture (OFWM)
O&M	Operations & Maintenance
SDA	Special Drawing Account

**1. NAME OF THE PROJECT**

Promotion of high value agriculture through solarization of drip & sprinkler irrigation systems

**2. LOCATION**

The proposed project will be implemented in the entire Punjab focusing on water scarce area including Potohar, Thal, Cholistan and Brackish groundwater. Location map of the project area is enclosed (**Annexure-A**).

**3. AUTHORITIES RESPONSIBLE FOR**

**a) Sponsoring**

Agriculture Department through Annual Development Program (ADP)

**b) Execution**

- i) Punjab Agriculture Department through Directorate General Agriculture (Water Management) Punjab, Lahore
- ii) Supply and Service Companies (SSCs)
- iii) Participating Farmers

**c) Operation & Maintenance**

- i) Participating Farmers
- ii) Supply and Service Companies (SSCs)

**d) Concerned Federal Ministry**

Not Applicable.

**4. PLAN PROVISION**

**a) If the project is included in the medium term/five year plan, specify actual allocation.**

Not applicable.

**b) If not included in the current plan, what warrants its inclusion and how it is now proposed to be accommodated.**

Government of the Pakistan is committed to revamp the agriculture sector to utilize its full potential to drive prosperity in the province for wellbeing of the farmers. National Climate Change Policy envisages to “*promote the development of renewable energy resources and technologies such as solar, wind, geothermal and bio-energy*”. Punjab Growth Strategy (PGS), 2018 envisions making a secure, economically vibrant, industrialized and knowledge-based province, which is prosperous and where every citizen can expect to lead a fulfilling life. PGS also envisages to enhance growth in agriculture by facilitating productivity improvement, increasing competitiveness in agriculture marketing & trade by providing a conducive climate for private sector investment, improving supply chain and value addition.

The proposed project is in line with the international commitments regarding climate change and national growth objectives. It aims at promoting Hi-Tech agriculture amongst the farming community for efficient utilization of farm level resources through effective application of precious inputs.

**c) If the project is proposed to be financed out of block provision, indicate provisions in the current year PSDP/ADP.**

Not applicable.

## **5. PROJECT OBJECTIVES**

The key objective of the project is to maximize the productivity of precious crop production inputs (water, fertilizer, energy etc.) besides enhancement in crop yields. The undertaking will have following key objectives.

- i) Reduce the operational cost of high efficiency irrigation system
- ii) Enhance crop and water productivity through optimal use of water and non-water inputs by application of modern climate smart technologies.
- iii) Promote use of solar energy in agriculture for promoting irrigated agriculture in remote areas.
- iv) Build farmers' capability at grassroots level for growing high value crops to get higher farm returns for alleviating poverty.
- v) Create job opportunities in rural areas through introduction of climate smart technologies for high value irrigated agriculture.

The project objectives are consistent with overall objectives of the agriculture sector for increasing farm productivity, ensuring food security, reducing cultivation costs, enhancing farm returns, economic uplift of small farmers, and improving agricultural economy of the country as a whole.

## **6. DESCRIPTION AND JUSTIFICATION OF THE PROJECT**

### **i) Punjab's Agro-based Economy**

Agriculture is a crucial driver of economic development in Punjab. It contributes a quarter to Punjab' GDP and about half of total provincial manpower depends on agriculture for their livelihood (**Figure-1**). Punjab is country's agricultural and economic heartland that contributes to about 80 percent of country's food requirements by producing 80 percent cotton, almost 70 percent wheat, nearly 60 percent sugarcane, and around 50 percent rice. More than 70 percent cropped area of the Pakistan's Indus food machine is situated in the Punjab and over 90 percent of province's agricultural production comes from irrigated lands. About two third of the population residing in rural areas rely directly or indirectly on this sector for their livelihood.

Despite critical significance of irrigated agriculture to national as well as provincial development, it could not perform sustainably mainly due to lack of modernization of agricultural operations leading to colossal loss of precious inputs resulting in low productivity.



**Figure-1:** Irrigated Agriculture Significance in Punjab

**ii) Crop and Water Productivity**

Despite immense potential, Punjab’s agriculture suffers from low productivity due to poor farm management practices, high production costs, inadequate water availability and limited knowledge of employing modern technologies for crop production. Small farmers are unable to make use of modern technologies due to their poor economic conditions and high initial cost of technologies. Furthermore, continuous price crash of all agricultural commodities has further aggravated the situation. Agricultural productivity is directly dependent on availability, quality and effective use of the inputs e.g. water, fertilizers, seed, energy etc.

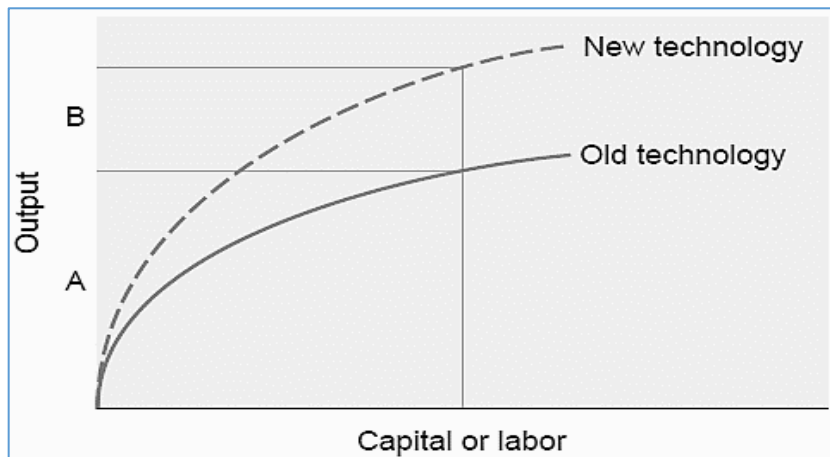
There is substantial variation in crop yields and corresponding water productivities of different crops as well as for the same crop grown in different parts of the world. This gap can be attributed to many factors including use of modern technologies, effective input management, balanced fertilizer applications, effective insect/ pest management etc. The efficacy of all these measures, however, largely depends upon water availability and its efficient use. It is pertinent to point out that the agriculture in Pakistan is based mostly on traditional non-scientific farming methods, which are the main cause of low crop and water productivity. There is huge scope for improving water productivity at the farm level through adoption of modern and more productive irrigation technologies for optimal use of inputs, particularly water, fertilizer and energy.

**iii) Technology Impact**

In economic terms, technological improvements imply a reduction in cost of production. The most sophisticated technology may, however, not be the optimal technology for the country. Technology for adaptation varies from hard to soft, simple to complex, inexpensive to costly, and

locally available to international technology transfer. Each type of technology has its own pros and cons and its suitability for adaptation hinges on location of deployment, and prevailing social, economic & environmental conditions as well as management practices within the locality.

Technological progress leads to more output from the same level of capital. **Figure-2** illustrates the benefits of technological progress. The solid line shows the original production function, which shifts out with technological progress. As such, the economy produces more output with new technology compared with the old knowledge for a given level of factor input as shown in **Figure-2**.

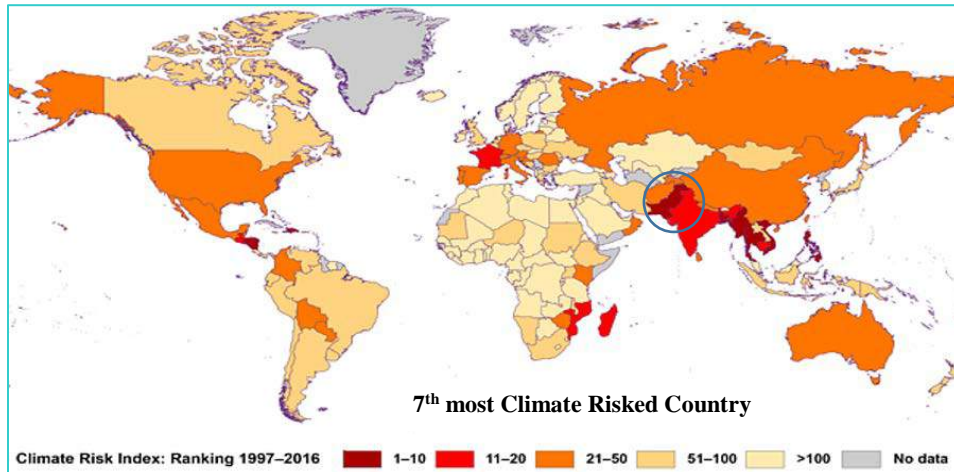


**Figure-2:** Impact of Technology on Output

#### iv) **Climate Smart and Sustainable Technologies**

Climate is one of the main determinants of agricultural production. Throughout the world, climate change is emerging as one of the main concerns for water resources management and water use activities, especially for agricultural production. Agriculture sector of developing countries, Pakistan being no exception, has become more vulnerable to the phenomenon due to their geographic, climatic, and economic settings. Pakistan ranks 7<sup>th</sup> on 2018 Global Long-Term Climate Risk Index published by GermanWatch (**Figure-3**) with maximum damages happened in the Punjab due to climate change events (change in temperature and erratic rainfall).





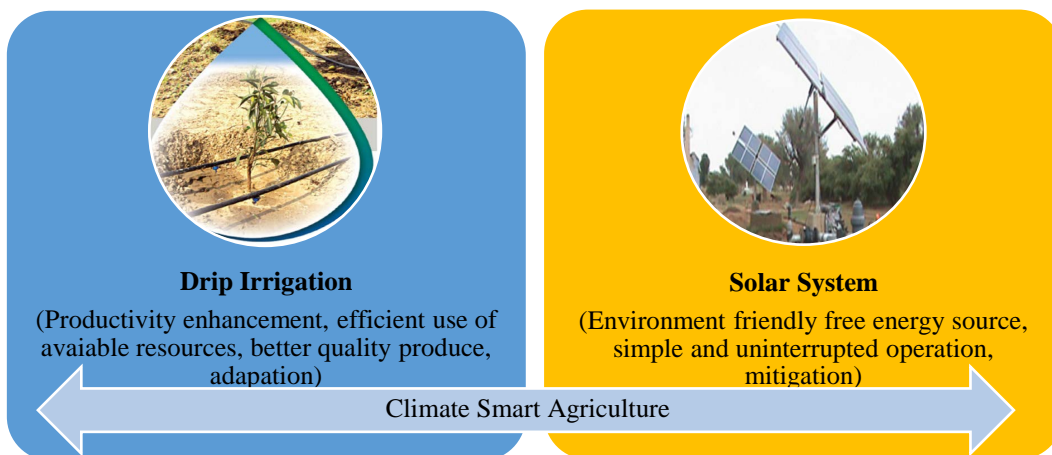
**Figure-3:** Climate Change Risk Index 2018

The interventions envisaged under the proposed project would entail promotion of Hi-Tech technologies including solar system coupled with the drip irrigation system for enhancing crop yields, reducing production cost, increasing farm incomes, improving livelihood of people, enabling farmers to adjust the agricultural practices with varying environments, promoting renewable energy sources and alleviating poverty in the province.

**v) Project Components**

The technologies under the proposed project will result in productivity enhancement, efficient resource management, crop diversification, better quality produce and promotion of environment friendly free energy source. Major activities to be carried out under the proposed project would include, inter alia, the followings.

Provision of solar systems to the farmers for operating drip & sprinkler irrigation systems on **20,000** acres.



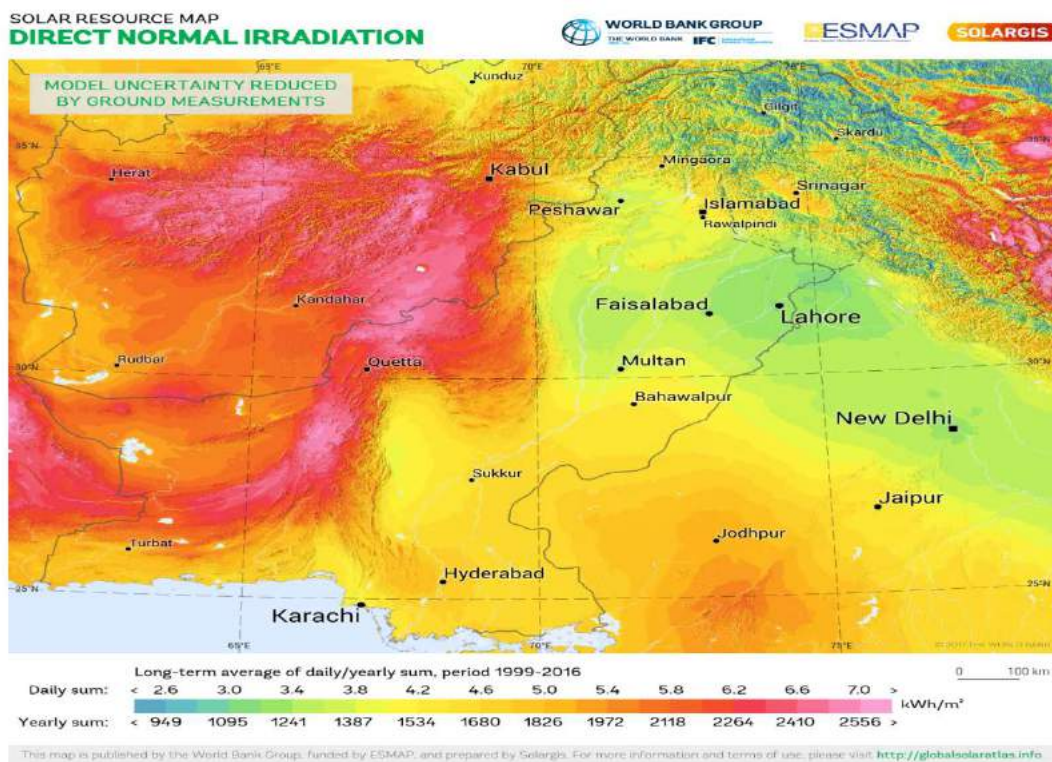
**Figure-4:** Climate Smart Technology Package

## Provision of Solar Systems to the Farmers on Drip & Sprinkler Irrigation Sites

The component will support provision of solar systems to the farmers who have either already installed the high efficiency irrigation systems or installing the same for cultivation of high value crops on **20,000** acres.

### i) Prospects of Solar Energy in Irrigation

Nature has blessed Pakistan with abundance of renewable energy resources, which have not been harnessed appropriately. Replacing or supplementing the conventional fuels for operating high efficiency irrigation system sites with solar energy seems workable option as sunlight is available for more than 300 days a year in Pakistan/ Punjab with about 8 hours effective daylight period. Most parts of the Punjab receive adequate solar radiation intensities over 5 Kw/m<sup>2</sup>/day (**Figure-5**). Its seasonal variations are also within acceptable limits. The arid/semi-arid climate of the Punjab, therefore, provides ideal conditions for adoption of solar energy for operating irrigation water pumps.



**Figure-5:** Prospects of Solar Radiation in Punjab

### ii) Solar Water Pumping Technology for Irrigation

Solar powered water pumps are globally used in places where other energy sources are not feasible/ available. The technology is advancing steadily, especially in the developing world like Asia and Africa. Its main uses have, however, been for drinking and small scale irrigation. The Indian government is subsidizing solar water pumping systems on a small scale for these purposes

in few states like Rajasthan, Gujrat, and Haryana. Rajasthan government is currently providing subsidy for installation of solar systems for irrigating orchards & vegetables with drip irrigation system. Likewise, the government of Gujrat is subsidizing solar water pumps to promote high-tech agriculture.

Keeping in view the applications of solar energy in agriculture, Agriculture Department launched “Promotion of High Value Agriculture through Provision of Climate Smart Technology Package” project whereby solar energy has been promoted for operating drip irrigation system. The project has been implemented very successfully and installed solar coupled drip irrigation systems on 21,255 acres during three years (2016-17 to 2018-19).

### iii) Impact of Solar Systems on HEIS Operational Cost

Based on the study carried out by the M&E consultants on solar coupled high efficiency irrigation systems (HEIS) installed under the PIPIP, it has been observed that the cost of HEIS operation is reduced significantly with solar systems compared to electricity and diesel engine. The same is illustrated in the figure given below.

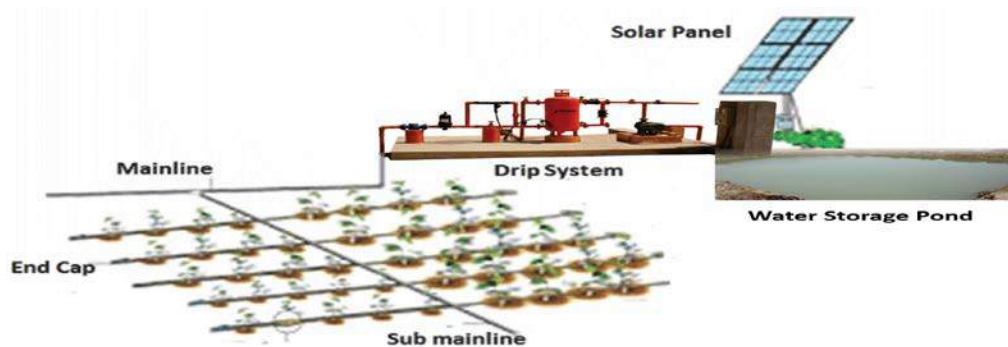


The quantifiable anticipated impact of the solarization of drip & sprinkler irrigation systems is given below.

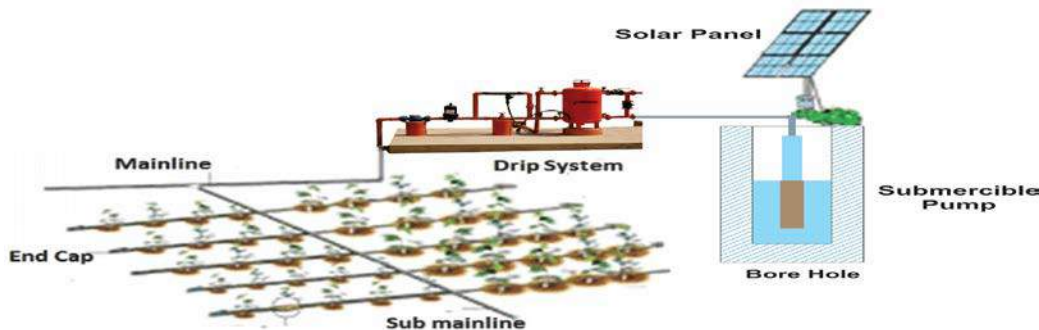
- ❖ Reduction in operational cost – 81%
- ❖ Increases in crop productivity – 109%
- ❖ Enhancement in net profit with HVA – 101%
- ❖ Water saving – 41%
- ❖ Reduction in CO<sub>2</sub> emission – 35,200 tons/ year
- ❖ Increase in adoption rate of HEIS – 3.7 times
- ❖ Job creation for young technicians – 4,000 Nos.
- ❖ Conversion of area to climate smart agriculture – 20,000 acres
- ❖ Employment generation for youth in rural areas – 2,000 Nos.

In view of successful intervention, it has been planned to install solar systems on suitable

/ selected sites for operating the drip/ sprinkler irrigation systems to utilize water from water storage ponds filled with canal/ rain/ groundwater for irrigating the crops. Site specific direct coupling with groundwater and gravity systems may also be allowed in special circumstances. These arrangements will help to ensure timely availability of irrigation water for crops, particularly at their critical stages through uninterrupted water supply from solar units. It is indicated that subsidized standard solar system would have the capacity to irrigate upto 15 acres drip/ sprinkler irrigation site by managing its irrigation frequency. The concept has been illustrated in **Figure-6 & 7.**



**Figure-6:** Typical Layout of Solar Powered Drip System (Storage Pond)



**Figure-7:** Typical Layout of Solar Powered Drip System (Direct Groundwater Pumping)

**iv) Prequalification of Supply & Service Companies for Solar**

It is planned that Supply & Service Companies (SSCs) will be pre-qualified under the project “Promotion of High Value Agriculture through Solarization of Drip & Sprinkler Irrigation Systems” by the Pre-Qualification Committee for installation of solar systems on turnkey basis besides provision of necessary post-installation technical assistance to the farmers for their successful operation and maintenance. The technical specifications for installation of solar systems including solar panels, pumps, structure, cables etc. used under the on-going scheme will be allowed for adoption under this scheme until new standards & specifications are finalized by the Technical Scrutiny Committee (TSC) and approved by Departmental Specifications Standardization Committee (DSSC). The scope of work/ TORs of SSCs would include but not

limited to the followings.

- i. Survey of the farmer's land/ site for technical feasibility in terms of potential for solar energy, availability of water for irrigation, its depth & quality, and daily crop water requirements.
- ii. Determine the need for storage of water and construction of water storage pond.
- iii. Size and design the site specific solar (PV) water pumping system for operating drip/ sprinkler irrigation system as per sample design (**Annexure-B**) and prepare bill of quantities alongwith cost estimates for its approval from the consultants.
- iv. Procure the materials, install the system as designed, and complete in all respect on turnkey basis within the stipulated period.
- v. Ensure supply of required amount of water by the installed solar system for operating drip/ sprinkler irrigation system.
- vi. Design the solar system for operating drip/ sprinkler irrigation system smoothly but discouraging flood irrigation.
- vii. Provide prompt post installation services for a period of two years through regular visits.
- viii. Ensure supply of spare parts to the beneficiaries, as and when required.
- ix. Provide warranties to undertake repair/replace any portion or the entire component of the system for a period of two years, if they are found to be defective in material or workmanship.
- x. Train the farmer for operations & maintenance (O&M) of the solar system
- xi. Provision of an operation & maintenance manual and logbook to the farmer in local language (Urdu) at the time of commissioning alongwith system warranty.
- xii. Guide farmers in making appropriate arrangements to avoid theft and vandalism. SSC will, however, not be responsible for any theft, fire, natural disaster, misuse, animal damage etc. or any other factor beyond the control of the supplier.

**v) Cost Sharing Formula**

It is planned that the cost sharing formula of 50:50 will be adopted under this scheme whereby, government will provide 50 percent of total solar system cost as subsidy and remaining 50 percent will be borne by the participating farmers. This will encourage the farmers for adoption of this new intervention, which may result in greater demonstration effect for up-scaling the technology. The beneficiary farmers will also be responsible for operation and maintenance of installed systems.

**vi) Selection Criteria for Provision of Solar System**

The solar systems affordable by small land holders would be provided to the farmers having farms with canal water supply for irrigation. Accordingly, following criteria is proposed for selection of farmers/farms for the purpose.

- a) Farmers who have already installed the drip/ sprinkler irrigation systems.

- b) Applicant is willing to contributing cost of system as per approved cost sharing formula.
- c) Farmer agrees to use solar system for operating high efficiency irrigation system only and would not use solar system for flood irrigation and/or any other purpose.
- d) The available water should be sufficient to meet water requirement of planned crops.
- e) The quality of stored water is usable for irrigation.
- f) Farmer undertakes that he/she will not sell or transfer or alter or hand over possession of the solar system to any person in any form within a period of five years.
- g) Applicant is not a defaulter of any government financial institution.
- h) Farmer will abide by the decisions of the government and/or authorized representative of the government and will not challenge the same in any court of law.
- i) Full cost of the equipment will be recoverable from the farmer as arrears of land revenue in case he/ she violates any of the conditions of the scheme especially use of solar system for groundwater pumpage for flood irrigation.
- j) Farmer agrees that he/she will be fully responsible for safety of the solar panel to avoid vandalism/ stealing/ damage by animals and there will be no responsibility on the department for such damages and he/she agrees to rectify the damage to make the system operative.

**vii) Implementation Procedure**

- a) It has been planned to provide solar systems to the farmers who are willing/ have already installed drip irrigation systems.
- b) Agriculture Department will allow the pre-qualified SSCs to work under the project and adopt already approved standards & specifications (**Annexure-C I-X**). Meanwhile, standards & specifications of solar equipment may be improved and got approved from Departmental Specification Standardization Committee of Agriculture Department, if required.
- c) Applications will be submitted by the farmers individually on a prescribed application form and only one member of the family will be eligible. Application forms will be available in the office of Director Agriculture / Deputy Director Agriculture /Assistant Director Agriculture (OFWM) free of cost.
- d) The application will be accompanied by an affidavit containing following declarations for which necessary documents would also be attached to support the claims.
  - i) Canal/ rainwater will be stored in the water storage pond for drip irrigation.
  - ii) Farmer has installed or willing to install drip/ sprinkler irrigation system.
  - iii) The beneficiary is ready to contribute his share as per approved cost sharing formula as well as willing to bear post installation maintenance costs.
  - iv) Applicant is not a defaulter of any government organization or financial institution.

- v) Applicant is willing to get requisite training in operation & maintenance of solar system.
  - vi) The beneficiary farmer agrees to use solar system for operating HEIS only and will not use it for flood irrigation.
  - vii) The farmer will not sell/ transfer/ handover the solar system to any other person in any form within five years.
  - viii) The farmer will not alter the parts of the solar system to change the capacity/ power of the system.
  - ix) The applicant will pay back entire amount of subsidy in case of violation of terms and conditions of subsidy.
  - x) The farmer will be responsible for any physical damage/ theft and its rectification at his/ her own cost.
  - xi) The farmer will abide by all directions/ decisions of the department/ authority and will not challenge in any court of law.
- e) The applications will be scrutinized against approved criteria and eligible applicants will be advised to approach the pre-qualified SSC of their own choice for survey, design, and cost estimation of the solar system for operating drip/ sprinkler irrigation system.
  - f) It will be ensured by the concerned DDA (OFWM) that the drip/ sprinkler irrigation system has already been installed/ being installed and/ or drip/ sprinkler system has been designed for its operation on solar systems before processing of case for solar system.
  - g) The selected SSC will survey the site, prepare design, bill of quantity (BOQ), and cost estimates considering site specific power requirement (5.76 & 8.96 KW) for operating HEIS with water from water storage pond (brackish groundwater and shallow watertable areas) or other sources. However, the ponds are not sustainable in some area especially Thal region under undulated topography & sandy soils. Furthermore, there are deeper watertables beyond 100 feet in the Potohar region. In both scenarios, solar system of 10.4 KW would be provided for operation of HEIS for the promotion of high value agriculture. The same will be offered to the concerned DDA (OFWM/ project consultants for review and approval.
  - h) The farmer, after approval of design and cost estimates, will be advised by the concerned DDA (OFWM) to deposit his/her entire share in the form of pay order/bank draft drawn in favor of selected SSC , which will be transmitted to Director General Agriculture (Water Management) Punjab alongwith requisite papers for issuance of work order.
  - i) The work order will be issued by the DGA (WM)/ Project Director and SSC will be bound to deliver the solar equipment alongwith other accessories as per BOQs at site within the prescribed timeframe mentioned in Tri-partite Agreement or work order.
  - j) The delivered equipment will be inspected against approved specifications and BOQs by the project consultants as third party validation.
  - k) After inspection of the delivered equipment, 50 percent of the system cost including pay order/ bank draft submitted by the farmer and remaining from the project funds will be paid by the DGA (WM) as 1<sup>st</sup> installment on recommendation of the consultants conveyed by concerned DDA (OFWM).

- l) The SSCs will complete the installation of solar system within prescribed time period after delivery/inspection of equipment. The installed system will be verified by the project consultants for its performance as per approved design and specifications.
- m) The consultants will ensure that coupling of solar system with drip/ sprinkler irrigation system is according to the approved guidelines, compatibility, and performs successful operation of the HEIS.
- n) The performance of installed solar system will be evaluated in terms of operation, design and discharge efficiency etc. and solar system will be handed over by the SSC to the beneficiary farmers in the presence of consultants and departmental representatives. At the time of commissioning/ handing over the system, the SSCs would ensure that
  - i) farmer has been trained in operation & maintenance of the solar system;
  - ii) logbook has been provided to the farmer;
  - iii) O&M manual in Urdu has been provided to the farmer; and
  - iv) Warranty card of the equipment has been handed over to the farmer.
- o) On the recommendation of the project consultants conveyed through DA (OFWM)/ DDA(OFWM), DGA (WM) will make 40% payment to the SSC on commissioning/ handing over of the solar system to farmer (2<sup>nd</sup> installment) by keeping 10% as retention money, which will be released after two years on provision of satisfactory post-installation services for successful system operation.
- p) Concerned DDA (OFWM) will visit the site on monthly/ quarterly basis and submit the report to the DA (OFWM) and Director General Agriculture (Water Management) Punjab/ Project Director on performance/ any issue in the installed solar system.
- q) The SSCs will be bound to provide the post installation services for at least two years.

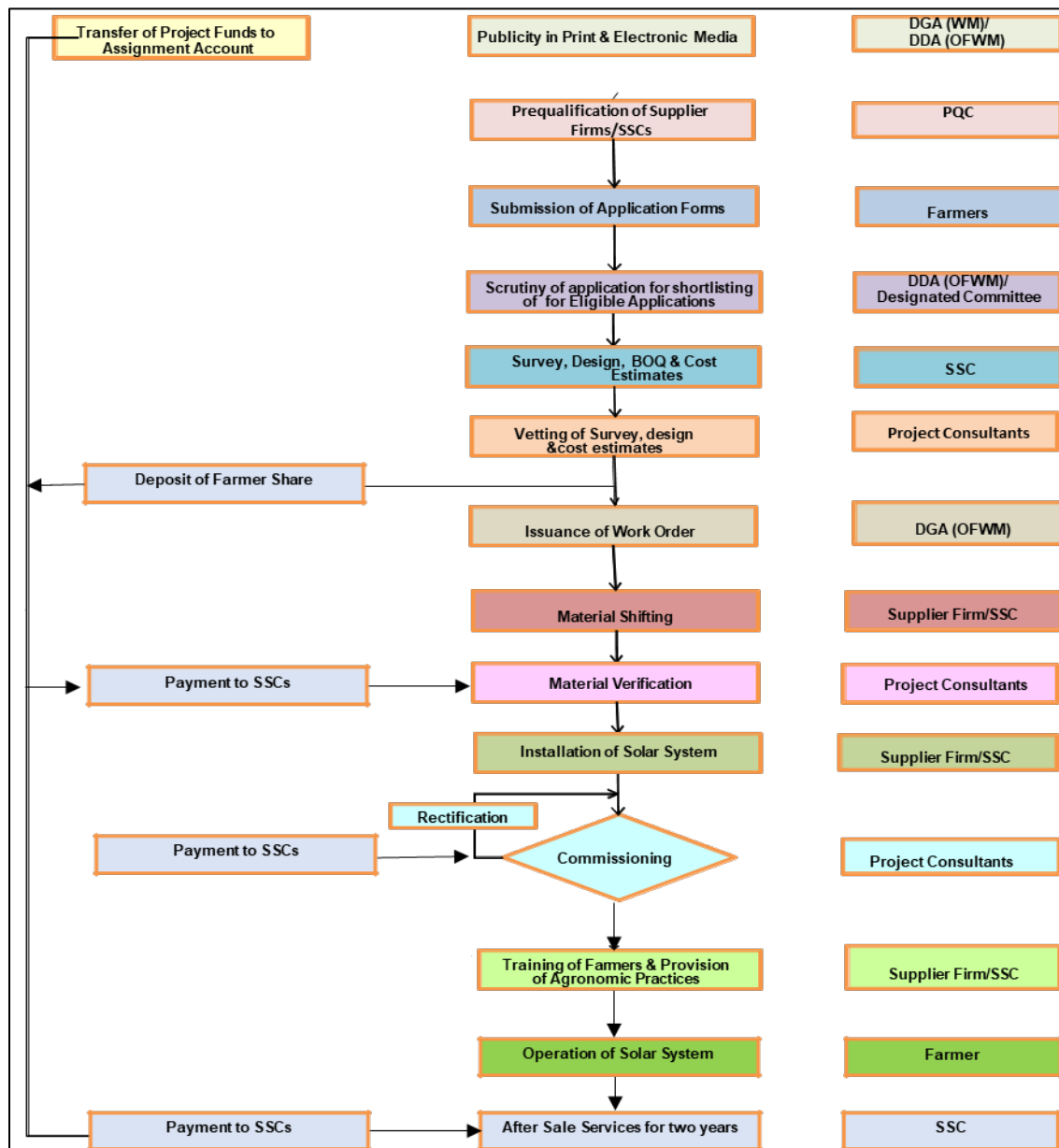
The procedure/ mechanism for disbursing subsidy of solar systems is given as under.

- a) The PQC at start of financial year would invite the item wise rates from the pre-qualified SSCs in sealed envelopes, open the sealed quotations and forward these rates to the project consultants for their scrutiny/ analysis. The project consultants would play the role of “**The Engineer**”.
- b) The project consultants would download the rates of relevant items available on website of the Punjab Government as well as conduct market surveys to firm up prevailing rates of solar items offered by the SSCs.
- c) The consultants will carry out rate analysis by preparing the comparative statements and would recommend the lowest rates from amongst the rates offered by various pre-qualified SSCs and collected from the market by the Rate Assessment Committee (RAC). Item wise rates downloaded from the Punjab Government website shall be adopted as such.
- d) The consultants would present these rates to the Rate Assessment Committee (RAC) of PQC for review/ assessment for preparing recommendation for the PQC.
- e) All the Directors Agriculture (OFWM) would be members of the RAC and will also get confirmation of item-wise rates offered by the SSCs from the local market at divisional level.
- f) The rates of various items would be deliberated & finalized in the RAC meetings and



recommended to the Pre-Qualification Committee (PQC) for approval.

- g) Upper ceiling item-wise rates/prices of various items for solar equipment against corresponding approved standards would be approved by the PQC based upon the backup calculation prepared by the consultants and RAC.
- h) The item-wise ceiling rates approved by the PQC would be notified to solar SSCs and other stakeholders for implementation. On the basis of item-wise ceiling rates, an average per acre cost of a standard system shall be fixed as upper ceiling cost.
- i) The farmers will be allowed to negotiate per acre ceiling rate downward with the supply & services companies (SSCs) of their own choice.
- j) All the pre-qualified firms would be asked to contact the eligible farmers/ applicants for installation of solar systems and each firm would have an equal opportunity to approach the eligible/ successful farmer and negotiate the rates with them downward living within the upper ceiling cost notified by PQC. Farmers would also have the right to select the SSC of his own choice.



## **Figure-8: Schematic Process for Installation of Solar System**

### **7. CAPITAL COST ESTIMATES**

#### **a) Indicate date of estimation of project cost estimates**

The cost estimates of project interventions have been prepared during March, 2019.

#### **b) Basis of Determining the Capital Cost**

Capital cost of the project is based on the prevailing average market rates of various items available in the open market during March 2019. The summary of unit cost of solar system for different options is enclosed as **Annexure-D (I-III)**

#### **c) Year-wise/ Component-wise Phasing of Physical Activities**

The year-wise and component-wise phasing of physical targets/activities of the project is appended at **Annexure-E**. It is indicated that the year-wise targets are indicative and the same will be approved by the PSC every year considering available resources.

#### **d) Year-wise/Component-wise Financial Requirements**

The year-wise/component-wise phasing of financial requirements out of ADP is provided as **Annexure-E**.

### **8. ANNUAL OPERATING AND MAINTENANCE COST AFTER COMPLETION OF PROJECT**

It is envisaged that Supply and Services Companies (SSCs) would assist the beneficiary farmers in operation and management of installed solar systems during warranty period and ensure provision of after sale service. The participating farmers would, however, be responsible for the operation and maintenance of equipment i.e. solar under the proposed project. It is indicated that proposed technologies/ interventions would need continuous technical support for its operation and maintenance even after project completion because life of solar is more than 20 years. The OFWM staff would provide technical support services to the farmers for sustainability of the envisaged interventions after project completion.

### **9. DEMAND AND SUPPLY ANALYSIS**

Water and energy are the most critical factors in crop production and their regular and assured supply play vital role in productivity enhancement. During last few years, acute shortage of both irrigation water and energy has resulted in reducing the crop and water productivity and threatened the sustainability of irrigated agriculture in the province. Accordingly, it is direly needed to ensure supply of water and energy to improve efficiency of agricultural inputs through efficient utilization of available resources for enhancing crop yields and lowering the cost of production. Access to modern technology by the small farmers is limited as they are unable to

make use of modern technology due to their poor economic conditions and high initial cost of the technology. There is gap of about 12 MAF of water in demand and supply of water for crop production due to system losses. Moreover, load shedding of more than 12 hours a day and high diesel prices have seriously affected the crop productions.

The envisaged technologies i.e. solar coupled drip & sprinkler system offer great opportunity and potential in meeting the above challenges and increasing farm productivity, ensuring food security, reducing cultivation costs, enhancing farm returns, economic uplift of small farmers, and improving agricultural economy of the country as a whole.

#### 10. FINANCIAL PLAN (FINANCING SOURCES)

**a) Equity**

NA

**b) Debt**

NA

**c) Grants alongwith Sources**

(Rs. in million)

Sources		Amount for Capital Cost	Amount for Recurring Cost
(a)	Foreign Assistance		
	i- Loan	-	-
	ii- Grant	-	-
	iii- Technical Assistance	-	-
(b)	Federal Government	-	-
	i- Grant	-	-
	ii- Loan	-	-
	iii- Investment	-	-
	iv- Direct Expenditure	-	-
(c)	Provincial Government	1,928.379	-
	i- Grant	-	-
	ii- Loan	-	-
	iii- Investment	-	-
	iv- Direct Expenditure	-	-
(d)	Sponsoring Agency's own fund	-	-
(e)	Private Investment (SSCs)	-	-
(f)	Local Body Resources, if any	-	-
(g)	Non-Government borrowing	-	-
(h)	Beneficiaries Contribution	1,750.000	-
(i)	Other sources (e.g. Recoveries)	-	-

**d) Weighted Cost of Capital**

NA

**e) Flow of Funds**

Assignment Account will be opened in the name of Director General Agriculture (Water Management) Punjab/ Project Director after authorization of the Finance Department and fulfilling prescribed codal formalities. The allocated funds will be transferred into Assignment Account by

Finance Department for its further utilization. The DGA (WM) would be allowed to maintain and operate the said account for channeling the released funds. The allocations will be approved by the Project Steering Committee (PSC) for payment of financial assistance/ subsidy for solar system as well as other transactions.

## **11. PROJECT BENEFIT AND ANALYSIS**

### **i) Financial Benefits**

The project will have both tangible and intangible benefits but there will be no direct income from the scheme to the government. The implementation of the project activities would result in substantial increase in farm incomes and provide enhanced employment opportunities to the rural population. Drip/ sprinkler irrigation technology would result in net additional benefits as compared to conventional methods of farming. Installing solar system for offsetting irrigation cost on HEIS equipped farms would save energy cost leading to reduction in production costs. The financial analysis for project interventions is given at **Annexure-F**.

### **ii) Economic Benefits**

The proposed project would have a transformational impact on Punjab's agriculture sector by cutting down the system losses through introduction of modern water and crop productivity enhancement and input cost reduction technologies. The interventions proposed under the project are economically feasible with following economic returns. The economic analysis for project interventions is given at **Annexure-G**.

i) EIRR	:	32.8 %
ii) BCR	:	2.2

Following positive outcomes are also expected from the scheme.

- i) A more efficient, productive and sustainable water application system delivering greater development impact at lesser cost to the government budget.
- ii) Increased agricultural growth, poverty alleviation, and private sector development in rural areas where most of the absolute poor are inhibited.
- iii) Substantial contribution in GDP due to higher agricultural output and greater rural employment.

### **iii) Technical Soundness of Project Activities**

The project interventions are technically viable/ sound and socially acceptable with significant potential for agricultural development in the Punjab. The payback period of the technology package envisaged under the project is about 3-4 years and life of the technology (solar) is more than 20 years. The increased crop and water productivities through envisaged technologies would enhance income level of the farmers. The production of solar energy for

operating HEIS will reduce requirement of electricity for the purpose, which will in turn make available more electricity for domestic and industrial purpose.

**iv) Social Benefits**

The project interventions would have substantial impact on social lives of the rural people. The increased crop and water productivities and reduction in operational cost through envisaged technologies would enhance income level of the farmers. The implementation of the project would provide direct employment to **2,000** people as Solar Operators and indirect employment opportunities to the rural population of project area as Machinists and Helpers for installation of solar system which will lead to social protection in the rural population. Moreover, establishment of repair and maintenance facilities for the technologies envisaged under the proposed project will open new avenues of employment for skilled workers. The production of solar energy for operating HEIS will reduce requirement of electricity for the purpose, which will in turn make available more electricity for domestic and industrial purposes.

**v) Environmental Impacts**

The project builds on existing infrastructure to bring operational improvements in crop production systems. It would, therefore, not cause any adverse environmental effects normally associated with new developments, e.g. resettlement, depletion of land and water resources, loss of wildlife habitat etc. Solar systems for operating HEIS would be introduced under the proposed project, which are environment friendly technologies. Solar system would replace conventional energy resources i.e. fossil fuels that would result in production of pollution free energy leading to contribution in environment protection. Overall, the climate smart technology package will optimize use of inputs including water, fertilizers and chemicals leading to significant contribution in conserving natural resources and ecosystem.

**vi) Employment Generation**

The implementation of the project would provide enhanced employment opportunities to the rural population of project area. It is estimated that about 1,700 persons will get direct employment as HEIS Operators. Improvement in crop yields will also boost economic activity in rural areas of the province that will also create further employment options. It is estimated that an amount of about Rs. 1,150.000 million would be contributed by the participating farmers for installation of solar systems under the project and these developments will create employment opportunities at operational stage. It is, therefore, concluded that project implementation will stimulate employment generation not only for skilled and unskilled labor in the villages but will help in opening of new earning opportunities in the rural sector.

**vii) Impact of Delays on Project Cost/Viability**

The dwindling water and energy resources including escalating surface water shortages, depleting groundwater aquifers, mining of subsurface water resources due to over exploitation and scarcity of energy for agriculture sector necessitate immediate adoption of water and energy conservation/ renewable technologies for efficient utilization of limited water resources. Any delay in implementation of proposed interventions may result in irreversible losses besides increase in project costs due to price escalation of materials.

**12. IMPLEMENTATION SCHEDULE**

**a) Starting and Completion Dates**

Starting Date	Completion Date
July 2019	June 2022

**b) Monitoring & Evaluation Framework**

The monitoring & evaluation framework for the proposed project is given below.

**i) Impact Level KPIs:**

Sr. No	Key Performance Indicators (KPIs)	Status	(2019-20)	(2020-21)	(2021-22)
1	Increase in water productivity with solar coupled HEIS i.e. output per unit of water used (kg/ m <sup>3</sup> or Rs./ m <sup>3</sup> )	Planned			
	Source of verification: Project Supervision & Monitoring Consultants reports	Achieved			

**ii) Outcome Level KPIs:**

Sr. No	Key Performance Indicators (KPIs)	Status	(2019-20)	(2020-21)	(2021-22)
2	i) Reduction in use of diesel (%)	Planned			
	Source of verification: Project Supervision & Monitoring Consultants reports	Achieved			
	ii) Saving in energy cost (PKR/KWH)	Planned			
	Source of verification: Project Supervision & Monitoring Consultants reports	Achieved			
	iii) Reduction in irrigation cost (%)	Planned			
	Source of verification: Project Supervision & Monitoring Consultants reports	Achieved			
	iv) Increase in crop yields (%)	Planned			
	Source of verification: Project Supervision & Monitoring Consultants reports	Achieved			
	v) Reduction in CO <sub>2</sub> emission (tones/acre/annum)	Planned			
	Source of verification: Project Supervision & Monitoring Consultants reports	Achieved			
	vi) No. of total beneficiaries benefitted due to solar coupled HEIS a) Direct b) Indirect	Planned			
	Source of verification: Project Supervision & Monitoring Consultants reports	Achieved			

**iii) Outputs Level KPIs:**

Sr. No	Key Performance Indicators (KPIs)	Status	Total	2019-20				2020-21				2021-22				
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
3	i) Number of acres of Solar operated HEIS installed	Planned														
	Source of verification: Project Supervision & Monitoring Consultants/ OFWM reports	Achieved														
	ii) Number of monitoring visits conducted by Director Agriculture (OFWM) during installation	Planned														
	Source of verification: Monitoring visits reports	Achieved														
	iii) Number of monitoring visits conducted by Deputy Director Agriculture (OFWM) during installation	Planned														
	Source of verification: Monitoring visits reports	Achieved														
	iv) Number of monitoring visits conducted by Assistant Director Agriculture (OFWM) during installation	Planned														
	Source of verification: Monitoring visits reports	Achieved														

#### iv) Roles & Responsibilities

**Impact:** Project Supervision & Monitoring Consultants will be responsible to collect the data for baseline as well as impact assessment.

**Outcomes:** Project Supervision & Monitoring Consultants will be responsible to collect the data for outcomes related key performance indicators (KPIs).

**Outputs:** OFWM field staff and Project Supervision & Monitoring Consultants will be responsible to collect the data for outputs related key performance indicators (KPIs).

The assumptions of the project indicators has been attached as **Annexure-H**.

### 13. PROJECT MANAGEMENT AND ADMINISTRATIVE STRUCTURE

The project activities will be implemented with existing infrastructure and human resource base of Agriculture Department. The government's overall policy of devolution of power will be adopted and district level offices will be executing agencies for envisaged interventions. The major project activities will be implemented through supply & service companies.

#### i) Provincial Setup

The Planning & Development Department (P&DD) is the apex organization at provincial level responsible for preparing overall development framework, coordination & monitoring of development programs/ projects, and provision of assistance to various departments for planning & executing the development activities. The Agriculture Department is responsible for agricultural development in the province through introduction of new technologies and provision of support services to the farmers for socio-economic development of the farmers. The proposed project will

be overseen and monitored by P&DD, Punjab. The project will be coordinated and managed by the Agriculture Department through its Water Management wing.

The project activities will primarily be implemented with existing human resource of Water Management wing. Director General Agriculture (WM), Punjab/ Project Director will supervise, manage, and monitor the proposed project activities from provincial headquarters through existing establishment.

**ii) Regional/ Divisional Project Coordination Support**

On promulgation of PLGA 2013, nine (9) Directorates Agriculture (OFWM) have been established at divisional level (Lahore, Multan, Rawalpindi, Sahiwal, Sargodha, Faisalabad, Gujranwala, D.G. Khan and Bahawalpur) to supervise OFWM activities and provide necessary technical support to the district offices as well as coordinate between provincial headquarters and field formations.

**iii) District and Tehsil Offices**

The Deputy Director Agriculture (OFWM) is responsible for supervision, coordination and internal monitoring of project activities at district level. The capacity of these offices has been strengthened by providing incremental support staff under the PIPIP. Assistant Director Agriculture (OFWM) at tehsil level is the functional tier of OFWM organizational setup for implementation of proposed works. The field activities will be executed by the Assistant Director Agriculture (OFWM) for which targets will be assigned to each tehsil.

**iv) Project Management**

It is planned that necessary project management arrangements will be adopted for successful execution of envisaged activities under the proposed project. Accordingly, the implementation, coordination, administration, and monitoring will be achieved through establishment of following institutional arrangement/ committees as given below.

- a) Project Steering Committee (PSC)
- b) District Implementation Committee (DIC)
- c) Pre-qualification Committee (PQC)

**a) Project Steering Committee (PSC)**

The Project Steering Committee (PSC) will be constituted comprising of following officers.

- |   |                   |
|---|-------------------|
| ▪ Secretary Agriculture   | Chairman          |
| ▪ Representative of Finance Department  | Member            |
| ▪ Representative of Agri. Section of P&DD                                     | Member            |
| ▪ Representative of Energy Department   | Member            |
| ▪ Director General Agriculture (Water Management) Punjab/<br>Project Director | Member/ Secretary |



The PSC would meet annually/ biannually to review the physical and financial progress as well as to suggest means to overcome the constraints/ bottlenecks faced in the field for execution of project activities. The major functions of PSC would be as follows.

- i. Approve annual work plan and streamline flow of funds.
- ii. Monitor physical and financial progress.
- iii. Approve/ amend/ change the criteria for selection of beneficiaries under various project components, if required.
- iv. Identify the constraints in achieving targets and devise strategies for their redressal.
- v. Review provincial/district monitoring reports and take appropriate actions.
- vi. Devise mechanism for transparent monitoring of project activities and issues related to the consultants and the SSCs.
- vii. Make necessary modifications/ improvements in project implementation modalities for smooth execution of project activities.

**b) District Implementation Committee (DIC)**

A District Implementation Committee (DIC) comprising the following would be constituted in each district to implement the program at district level as per plan.

- |   |                  |
|---|------------------|
| ▪ Deputy Commissioner                                 | Chairman         |
| ▪ Additional Deputy Commissioner (Finance & Planning) | Member           |
| ▪ Director Agriculture (OFWM)                         | Member           |
| ▪ Representative of Revenue Department                | Member           |
| ▪ Deputy Director Agriculture (OFWM)                  | Member/Secretary |

The DIC is proposed to meet on monthly basis. The major functions of DIC are as follows.

- i. Review physical and financial progress.
- ii. Ensure effective implementation of project.
- iii. Arrange transparent internal monitoring.
- iv. Make recommendation to PSC for improving pace of implementation.
- v. Resolve field dispute/ issues locally to ensure smooth implementation of project activities.

**c) Pre-Qualification Committee (PQC)**

A Pre-Qualification Committee (PQC) comprising the following would be constituted at provincial level to carry out prequalification of SSCs, approval of solar equipment rates etc.

- |   |                   |
|---|-------------------|
| ▪ Additional Secretary (Planning), Agri. Department | Chairman          |
| ▪ Representative of Finance Department              | Member            |
| ▪ Representative of P&D Department                  | Member            |
| ▪ Director General Agriculture (Field) Punjab       | Member            |
| ▪ Senior Technical Officer, APFC, Agri. Department  | Member            |
| ▪ Project Director, PMU, PIPIP                      | Member            |
| ▪ Director General Agriculture (WM) Punjab          | Member/ Secretary |

The Terms of Reference (TORs) for PQC include, interalia, the followings.

- i. Develop/ prepare RFP/ pre-qualification documents, evaluation criteria for short-listing/ pre-qualification of SSCs for installation of solar systems as per PPRA, rules 2014.
- ii. Amend/ change the approved pre-qualification criteria (s) of SSCs for various services

including installation of solar system.

- iii. Carryout evaluation of proposals submitted by SSCs for pre-qualification and approve prequalification of the eligible firms.
- iv. Approve eligible SSCs to work under the project for various services.
- v. Approve tripartite agreement to be signed with selected SSCs for provision of services under the project.
- vi. Finalize/ notify upper ceiling rates/prices of various equipment of solar to be provided to the farmers.
- vii. Update standards and specifications of equipment to be provided to farmers and make improvements/refinements after rectification of identified shortfalls bi-annually.
- viii. Fix price band for item wise rates of the solar systems by inviting competitive rates (having specific standards & specifications) from the individual pre-qualified SSC in sealed envelopes, arrange to conduct market survey (collecting quotations) through Rate Assessment Committee (sub-committee of PQC) to assess the price of each item of solar systems and notify the item wise rates periodically for adoption by the SSCs/ farmer under the project.
- ix. Any other task/ function assigned by the Project Steering Committee.

**d) Rate Assessment Committee (RAC)**

A rate assessment committee comprising of the following members would be constituted under PQC to finalize the rates of solar equipment for approval by the PQC.

- |  |          |
|--|----------|
| ▪ Deputy Project Director (HEIS & LASER) | Convener |
| ▪ All Directors Agriculture (OFWM)       | Members  |
| ▪ Design Engineer (PSMC)                 | Member   |

The Terms of Reference (TORs) for RAC include, interalia, the followings.

- i. Review the rates of solar equipment periodically.
- ii. Carryout market survey to assess the item wise rates for their finalization.
- iii. Finalize the item wise rate of solar equipment and submit to DGA (WM) for placement before PQC for approval.

**v) Supervision and Monitoring of Project Activities**

A well reputed and specialized consultancy firm will be recruited in accordance with the PPRA Rules 2014 for provision of project implementation, supervision, third party validation, monitoring and technical support to OFWM staff at provincial, regional, district, and field level for execution of project activities. Consultancy services for project supervision and monitoring are required to ensure that the activities envisaged under the project are executed in an orderly manner with a high standard of workmanship and specified quality of materials within the envisaged implementation period and in conformity with best possible and latest technical, social and environmental standards. The tasks and activities include, but not limited to:

- i) Review the designs and standards & specifications for installation of solar system for operating high efficiency irrigation systems.

- ii) Monitor all project activities including technical, environmental, social, economic aspects etc. to evaluate actual achievement against the activities planned in the PC-I;
- iii) Provide support in procurement process including pre-qualification of supply and service companies (SSCs), invitations of bid, evaluation of bids and make recommendations as well as prepare all relevant documents for award of contracts;
- iv) Maintain detailed technical record and financial accounts & other project records and prepare other documentation as may be required by the client and government of the Punjab;
- v) Extend technical support for maintaining information related to project activities regarding facilities/ services, applications, procedures, progress etc.;
- vi) Assist in procurement, financial, social and environmental management of project activities;
- vii) Prepare Terms of Reference (TORs) for carrying out any additional studies, recruitment of SSCs etc;
- viii) Liaise with provincial, divisional, district and tehsil offices for smooth execution of field activities;
- ix) Notify the Director General Agriculture (Water Management) Punjab/ Project Director about compliance/ non-compliance of works against agreed criteria and standards & specifications;
- x) Prepare daily, monthly, quarterly, and annual progress & monitoring reports for proposed project activities besides other periodic reports as per requirements of project management;
- xi) Provide support for contract management and preparation of contract documents as required by the Client (Government of Punjab);
- xii) Check the completed works, carry out measurements, estimate the cost & payments, certify the payments, and quality of the works in accordance with the approved standards and specifications as a third party;
- xiii) Carry out impact evaluation of project activities to assess the project benefits;
- xiv) Implement the overall monitoring and evaluation plan including collecting, analyzing, and reporting project data for continued effective tracking of project objectives; and
- xv) Support in project management based on modern concepts, implementation of works, implementation of the communication strategy and plan, support to Director General Agriculture (WM) Punjab/ Project Director for preparation of project implementation plans, expenditure planning, budgeting and financing forecast and work plans, as required by the government and financing agency(s) of the project as well as assistance in developing the procurement plans, contract management, and financial management.

The TORs of the Project Supervision & Monitoring Consultants (PSMC) including their team of experts and man-month requirement for the project period are enclosed (**Annexure-I**).

**vi) Risk Mitigation Plan**

There would be no major risk involved in implementation of proposed project activities. Few risks and their extent have, however, been identified/ anticipated which may affect the project

progress. Accordingly, their mitigation strategies have been proposed for ensuring smooth implementation of project activities and the same is enclosed (**Annexure-J**).

**vii) Materials, Supplies and Equipment Requirement**

It is envisaged to utilize existing facilities and infrastructure for implementation of the proposed scheme.

**14. ADDITIONAL PROJECTS/ DECISIONS REQUIRED**

Not Applicable.

15. CERTIFICATE

Certified that the project proposal has been prepared in the light of instructions provided by the Planning Commission for the preparation of PC-I for production sector projects.

Prepared by:



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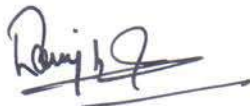
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# Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

## Project Area Map (Punjab Province)



## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Scenario 1 (A): By Capping of Horse Power (HP) on direct Suction

Sr. No.	Horse Power (HP)	Crop Type	No. of Plants/acre (in case of orchard)	Acreage covered (Acres)	
				Min	Max
1	7.5	Orchard (Citrus/Guava/Olive)	194	6	9.5
		Vegetables	-	3	9.5
2	5.5	Orchard (Citrus/Guava/Olive)	194	4.5	6.5
		Vegetables	-	2.25	7

### Scenario 1 (B): By Capping of Horse Power (HP) on water storage pond

Sr. No.	Horse Power (HP)	Crop Type	No. of Plants/acre (in case of orchard)	Acreage covered (Acres)	
				Min	Max
1	7.5	Orchard (Citrus/Guava/Olive)	194	7.5	12
		Vegetables	-	4	11.5
2	5.5	Orchard (Citrus/Guava/Olive)	194	6	10
		Vegetables	-	3	9

**Promotion of High Value Agriculture through Solarization of Drip and  
Sprinkler Irrigation Systems  
(Polycrystalline 60 cell series)**

Sr. No.	Item/Feature	Specification
	Application	To absorb the sunlight as a source of energy to generate electricity
1	Capacity and series type	250 to 290-Watt Poly 60 cell series
2	Solar Cell	Polycrystalline silicon
3	Module Efficiency	≥15.5 %
4	Power tolerance	Positive tolerance only
5	Operating temperature	from -20° to +80° Celsius
6	International standards compliance	IEC61215:2005, IEC61730-1-2. Valid TUV Certification.
7	Identification	Barcode
8	Labeling & Import Data	Name of Manufacturer, Unique Model Number and Serial Number, Maximum Performance Pmax, Maximum Power voltage Vmp, Maximum Power Current Imp, Open Circuit Voltage Voc, Short Circuit current Isc, Month and year of manufacturing (the age of the module must not be more than one year at the time of installation)
9	Junction Box	PVC
10	Junction Box Standard	IP67 and above
11	Performance Warranty	25 years i.e, insurance backed warranty (Manufacturer warranty on letter head), global irrevocable and immediate insurance-backed with 3 <sup>rd</sup> party policy rights of operation. Performance warranty will be linear.
12	Materials and workmanship warranty	10 years Free
13	Power Output Warranty	Power output within 10 years Shall not fall below 90%. Power output within 25 years Shall not fall below 80%.
14	Degradation	Panels should be Potential Induced Degradation (PID) free/anti PID / PID resistant
15	Origin	Imported Tier 1 Manufacturer
16	Temperature Coefficient of Maximum Power (Pmax)	≤ -0.43% / °C
17	Minimum efficiency at 200W/m <sup>2</sup> (25°C, AM 1.5)	Equal to or more than 95% of the module efficiency at STC
18	Connector	MC4 equivalent connectors



## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

(Polycrystalline 72 cell series)

Sr. No.	Item/Feature	Specification
	Application	To absorb the sunlight as a source of energy to generate electricity
1	Capacity and series type	300 to 360-Watt Poly 72 cell series
2	Solar Cell	Polycrystalline silicon
3	Module Efficiency	≥16 %
4	Power tolerance	Positive tolerance only
5	Operating temperature	from -20° to +80° Celsius
6	International standards compliance	IEC61215:2005, IEC61730-1-2. Valid TUV Certification.
7	Identification	Barcode
8	Labeling & Import Data	Name of Manufacturer, Unique Model Number and Serial Number, Maximum Performance Pmax, Maximum Power voltage Vmp, Maximum Power Current Imp, Open Circuit Voltage Voc, Short Circuit current Isc, Month and year of manufacturing (the age of the module must not be more than one year at the time of installation)
9	Junction Box	PVC
10	Junction Box Standard	IP67 and above
11	Performance Warranty	25 years i.e, insurance backed warranty (Manufacturer warranty on letter head), global irrevocable and immediate insurance-backed with 3 <sup>rd</sup> party policy rights of operation. Performance warranty will be linear.
12	Materials and workmanship warranty	10 years Free
13	Power Output Warranty	Power output within 10 years Shall not fall below 90%. Power output within 25 years Shall not fall below 80%.
14	Degradation	Panels should be Potential Induced Degradation (PID) free/anti PID / PID resistant
15	Origin	Imported Tier 1
16	Temperature Coefficient of Maximum Power (Pmax)	≤ -0.43% / °C
17	Minimum efficiency at 200W/m <sup>2</sup> (25°C, AM 1.5)	Equal to or more than 95% of the module efficiency at STC
18	Connector	MC4 equivalent connectors

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

(Monocrystalline 60 cell series)

Sr. No.	Item/Feature	Specification
	Application	To absorb the sunlight as a source of energy to generate electricity
1	Capacity and series type	250 to 290-Watt Mono 60 cell series
2	Solar Cell	Mono-crystalline silicon
3	Module Efficiency	≥16 %
4	Power tolerance	Positive tolerance only
5	Operating temperature	from -20° to +80° Celsius
6	International standards compliance	IEC61215:2005, IEC61730-1-2. Valid TUV Certification.
7	Identification	Barcode
8	Labeling & Import Data	Name of Manufacturer, Unique Model Number and Serial Number, Maximum Performance Pmax, Maximum Power voltage Vmp, Maximum Power Current Imp, Open Circuit Voltage Voc, Short Circuit current Isc, Month and year of manufacturing (the age of the module must not be more than one year at the time of installation)
9	Junction Box	PVC
10	Junction Box Standard	IP67 and above
11	Performance Warranty	25 years i.e, insurance backed warranty (Manufacturer warranty on letter head), global irrevocable and immediate insurance-backed with 3 <sup>rd</sup> party policy rights of operation. Performance warranty will be linear.
12	Materials and workmanship warranty	10 years Free
13	Power Output Warranty	Power output within 10 years Shall not fall below 90%. Power output within 25 years Shall not fall below 80%.
14	Degradation	Panels should be Potential Induced Degradation (PID) free/anti PID / PID resistant
15	Origin	Imported Tier 1
16	Temperature Coefficient of Maximum Power (Pmax)	≤ -0.43% / °C
17	Minimum efficiency at 200W/m <sup>2</sup> (25°C, AM 1.5)	Equal to or more than 95% of the module efficiency at STC
18	Connector	MC4 equivalent connectors

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

(Monocrystalline 72 cell series)

Sr. No.	Item/Feature	Specification
	Application	To absorb the sunlight as a source of energy to generate electricity
1	Capacity and series type	300 to 360-Watt Mono 72 cell series
2	Solar Cell	Mono-crystalline silicon
3	Module Efficiency	≥16.75 %
4	Power tolerance	Positive tolerance only
5	Operating temperature	from -20° to +80° Celsius
6	International standards compliance	IEC61215:2005, IEC61730-1-2. Valid TUV Certification.
7	Identification	Barcode
8	Labeling & Import Data	Name of Manufacturer, Unique Model Number and Serial Number, Maximum Performance Pmax, Maximum Power voltage Vmp, Maximum Power Current Imp, Open Circuit Voltage Voc, Short Circuit current Isc, Month and year of manufacturing (the age of the module must not be more than one year at the time of installation)
9	Junction Box	PVC
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11	Performance Warranty	25 years i.e, insurance backed warranty (Manufacturer warranty on letter head), global irrevocable and immediate insurance-backed with 3 <sup>rd</sup> party policy rights of operation. Performance warranty will be linear.
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15	Origin	Imported Tier 1
16	Temperature Coefficient of Maximum Power (Pmax)	≤ -0.43% / °C
17	Minimum efficiency at 200W/m <sup>2</sup> (25°C, AM 1.5)	Equal to or more than 95% of the module efficiency at STC
18	Connector	MC4 equivalent connectors

**TECHNICAL SPECIFICATION OF PUMP CONTROLLER/VFD**

<b>Sr. No.</b>	<b>Item/Feature</b>	<b>Specification</b>
1	Application	Converts D.C voltage to A.C voltage and regulates the functions of the pump
2	Standard Compliance	IP65 or above
3	Efficiency	≥95 %
4	Type	Wall mounted
5	Free warranty period	02 years from the date of certification including replacement and O&M service or more as provided by manufacturer
6	Built-in functions	Variable Frequency Drive. Automatic Start and Stop with any input power (solar, Grid and Generator). Self-diagnostic and self-Protection. Multi-string input with failure. Dry run protection detection. MPPT (Maximum Power Point Tracking).
7	Controls	Digital controls with complete protective functions. Instantaneous output status display (Speed / Power /Amps) etc. Intelligent Power module (IPM) with LED displays or external display through smart phone for operating system. Data logging (Optional). Ground fault monitoring. AC short circuit protection. Under/Over Voltage & Over Current protection. Low Voltage Disconnect (LVD). Overcharge Protection. Reverse Current Blocking.
8	Temperature range	-10° to + 60° Celsius
9	Rated output voltage	A.C and D.C rated voltage (single/three phase)/rated voltage matching with the motor.
10	Origin	Imported

**TECHNICAL SPECIFICATIONS OF SUBMERSIBLE PUMP SET**

<b>Sr No.</b>	<b>Items/Feature</b>	<b>Specification</b>
<b>Submersible Pump</b>		
1	Materials	Impeller=AISI304, Housing= AISI304, Shaft= AISI304 (Stainless steel)
2	Specific Speed	2900 rpm
3	Pump set efficiency	Greater than or equal to 55%
4	Performance tolerance Standard	ISO9906
5	Quality assurance	Third Party inspection / Testing report
6	Origin	Imported / Local
7	Discharge	As per site Requirement
8	Head	As per site Requirement
<b>Motor</b>		
1	Type	Submersible Motor
2	Materials	Stainless steel
3	Rated Voltage	220-240/380-440 V
4	Voltage Tolerance	± 5% Volt
5	Phase	Single/three
6	Connection Standard	DIN/NEMA
7	Ingress Protection	IP68 totally against the powder /the effects of the submersion to precise conditions of pressure
8	Cooling Method	Water Cooled
9	No of Poles	Two
10	Frequency	50Hz
11	Thermal Protection	PT100
12	Operational suitability	VFD Supported
13	Origin	Imported / Local
14	Warranty	Minimum 02 years or more

**All items/ products must be brand new with original packing  
In case of DC Motors, built-in inverter is mandatory.**

**TECHNICAL SPECIFICATION OF CENTRIFUGAL PUMP**

<b>Sr. No.</b>	<b>Items/Feature</b>	<b>Specification</b>
<b>Centrifugal Pump</b>		
1	Materials	Impeller=Cast Iron, Housing= Cast Iron, Shaft= Stainless steel
2	Specific Speed	2900 rpm
3	Performance tolerance Standard	ISO9906
4	PN Rating	PN16
5	Connection Standard	DIN/NEMA
6	Quality assurance	Third Party inspection / Testing report
7	Efficiency	Greater or equal to 60 %
8	Origin	Imported/Local
9	Discharge	As per site Requirement
10	Head	As per site Requirement
11	Warranty	Minimum 02 years or more

**All items/ products must be brand new with original packing**

**TECHNICAL SPECIFICATION OF SURFACE MOTOR**

<b>Sr. No.</b>	<b>Items/Feature</b>	<b>Specification</b>
<b>Surface Motor</b>		
1	Type	Surface Motor
2	Materials	Cast Iron/Aluminum
3	Specific Speed	2900 RPM
4	IE Efficiency	IE2 and above
5	Insulation Class	"F" The class F insulation system provides an exceptional margin of safety and ensures a longer thermal life even in abnormal operating conditions
6	Rated Voltage	220-240/380-440 V
7	Voltage Tolerance	± 5% V
8	Phase	Single/three
9	Ingress Protection	IP55 – Protection against the powder/Protect against water jets
10	Cooling Method	IC411 fan cooled
11	No of Poles	Two
12	IEC Standard	IEC 60034-30:2008/IEC 60034-2-1:2007
13	Operational suitability	VFD Supported
14	Frequency	50 Hz
15	Mounting	Foot Mounted
16	Efficiency	85% or more
17	Origin	Local/Imported
18	Warranty	Minimum 02 years or more

**All items/ products must be brand new with original packing**

**TECHNICAL SPECIFICATION OF SOLAR ARRAY PANEL STRUCTURE**

<b>Sr. No</b>	<b>Item/Feature</b>	<b>Specification</b>
1	Application	The structure carries solar modules straight to sunlight and provides manual tracking. 2 axis
2	Type	Ground mounted (Pole) with manual or automatic tracking
3	Material	Grade 60 Steel (for reinforcement of concrete only)
4	Galvanization	100 microns Hot Dipped Galvanization for mounting structure. All nuts and bolts installed to the whole structure must be of stainless steel. No drilling and cutting is allowed at site.
5	Quality Standard	ISO 9001
6	Wind bearing velocity	150 km/hr
7	Tracking options	Seasonal and daily variations
8	Civil Work	1:2:4 Concrete mixture ( $\geq 70$ cubic.ft. for single pole having capacity to bear up to 3.4 KW solar array, maximum number of 10 panels on a pole). Base 5'x 5'x 1', Concrete block 3'x 3'x 5'. Shuttering of bricks/metallic for base and concrete block.
9	Top Structure	T-frame / middle pipe diameter 4", 3mm, 78 & 82 length with 2 angle adjusters of 3 holes. Side arms 2"x 2"x 5mm x 13feet or with horizontal pipe beams. Angle for PV adjustment 2"x2"x5mm, length depends upon panels or cam shaft provision for seasonal variations.
10	Base Plate	Base plate 15"x15", 16mm thickness with 4-arrays of 12"x4"x6mm thickness.
11	Main Pole	Main pipe diameter 5.5" (OD), 6mm thickness flange at 4 feet. 5-foot height. Flange with groove of 8mm with eight holes, with cap having 3mm thickness flange with 2 holes, with angle adjusters and pipe clips. Tracking of solar panels through groove surface (8 mm balls, 72 nos. minimum in groove). All nuts, bolts and other accessories to be of stainless steel. A piece of base plate equal to outer diameter of main pole will be removed and 360-degree welding of main pole to base plate will be done after fully inserting the main pole in the base plate.
12	Reinforcement Cage in civil work	4-J-bolts, 7/8" rod thickness, height 72", bend 06", 5 rings of 3/8" thickness, 12"x12" center to center
13	Warranty period	10 Years free
14	Anti-theft provisions	The mounting structure equipped with anti-theft screws/clamps to prevent removal of any element of the structure (optional)
15	Grounding & Earthing	The PV System and the entire structure shall be properly grounded according to Electricity Act of Pakistan. This is to ensure the requisite ohmic resistance and safety of the PV System along with connected electrical appliances.

**Note: Minor variations are allowed subject to department's approval. In case major variations are required on site, the structural and mechanical drawings would be prepared by SSCs and afterwards these design parameters will be verified at site by the Dispute Resolution Committee.**



**TECHNICAL SPECIFICATION OF ELECTRICAL CABLES FOR SOLAR ARRAY  
WIRING**

Sr. No	Item/Feature	Specification
1	Application	To carry current
2	Type	Single conductor type, 99.99% Copper, Cross-sectional area of 4 mm <sup>2</sup> or higher, 1000 V / Class II (according to protection class II / 1000V, single core cable, tinned copper conductor, XLPE Insulation, double EVA jacket (resistant to heat and cold, resistant to ozone, UV, oil and chemicals), Temperature range: -40 to 90 ° C (Temperature Peak. allowable: 120 ° C), Halogen free. DC cables shall be suitable for the environmental conditions at the Project site, including UV protection and rodent protection.
3	Color Coding	Positive: Red or brown. Negative: Black or blue
4	Cable losses	Ohmic losses less than 1% for DC cables and 0.5% for AC cables
5	Cable binders	Cable, cable binders, clamps and other fixing material must also be UV-resistant, made of polyethylene.

**TECHNICAL SPECIFICATION OF POWER DISCONNECT (CIRCUIT BREAKERS  
AND BREAKER BOX)**

<b>Sr. No</b>	<b>Item/Feature</b>	<b>Specification</b>
1	Application	To connect and disconnect the power and to enclose them in proper housing
2	Ingress Protection	IP 54 or higher for breaker box
3	Voltage	Have voltage ratings greater than the maximum circuit voltage
4	Current	Have current ratings between 125% and 150% of the maximum design current for the circuit
5	Display	All power disconnect should include a clear visual indication of their state (ON/OFF or I/O)
6	Alternate source switch over	There must be a switch over to power the pumping system with grid or generator on request of farmer

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Bill of Material for 5.5 HP Solar System

<b>Horsepower 5.5 HP</b>	<b>Solar Power 5.76 Kw</b>	<b>Area 05 Acres</b>
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No	Component	Quantity	Cost	Total Cost
1.	PV Module (Poly/Mono 60/72 cell) Pmax 320 Wp	18	19,840	357,120
2.	Pump Controller/Variable Frequency Drive (5.5 KW)	1	185,000	185,000
3.	Solar Panel Array Structure with civil work	2	100,000	200,000
4.	Electrical Cables (AC Cable 6mm 3 core voltage rating 440 V)	30	440	13,200
5.	Electrical Cables (DC Cable 4mm single core voltage rating 1000 V)	90	247	22,230
6.	AC Breaker 16A, 3 poles	1	3,510	3,510
7.	DC Breaker 16A, 2 poles	1	6,626	6,626
8.	Breaker Box & changeover switch	1	12,000	12,000
9.	Earthing & Grounding (According to Electricity act of Pakistan) including borehole, earthing rod, earthing powder etc.	1	per site	20,000
10.	Survey, Design & Estimate	1	5,000	5,000
11.	Transportation	1	20,000	20,000
12.	Installation	-	33,000	33,000
13.	Post Installation O&M	6.00%		52,661
14.	<b>Sub total Cost in PKR</b>			<b>930,347</b>
15.	<b>Total Project Cost in PKR</b>			<b>930,347</b>
16.	<b>Per KW Cost in PKR</b>			<b>161,519</b>
17.	<b>Per Acre Cost in PKR</b>			<b>186,069</b>
18.	<b>Government Share in PKR (50%)</b>			<b>465,174</b>
19.	<b>Farmer Share (50%) in PKR</b>			<b>465,174</b>

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Bill of Material for 7.5 HP Solar System

Horsepower 7.5 HP	Solar Power 8.96 Kw	Area 7.50 Acres		
No	Component	Quantity	Cost	Total Cost
1.	PV Module (Poly/Mono 60/72 cell) Pmax 320 Wp	28	19,840	555,520
2.	Pump Controller/Variable Frequency Drive (11 KW)	1	195,000	195,000
3.	Solar Panel Array Structure with civil work	3	100,000	300,000
4.	Electrical Cables (AC Cable 6mm 3 core voltage rating 440 V)	30	440	13,200
5.	Electrical Cables (DC Cable 4mm single core voltage rating 1000 V)	150	247	37,050
6.	AC Breaker 25A, 3 poles	1	3,510	3,510
7.	DC Breaker 16A, 2 poles	2	6,626	13,252
8.	Breaker Box & changeover switch	1	12,000	12,000
9.	Earthing & Grounding (According to Electricity act of Pakistan) including borehole, earthing rod, earthing powder etc.	1	per site	20,000
10.	Survey, Design & Estimate	1	5,000	5,000
11.	Transportation	1	35,000	35,000
12.	Installation	-	44,000	44,000
13.	Post Installation O&M	6.00%		74,012
14.	<b>Sub total Cost in PKR</b>			<b>1,307,544</b>
15.	<b>Total Project Cost PKR</b>			<b>1,307,544</b>
16.	<b>Per KW Cost in PKR</b>			<b>145,931</b>
17.	<b>Per Acre Cost in PKR</b>			<b>174,339</b>
18.	<b>Government Share in PKR (50%)</b>			<b>653,772</b>
19.	<b>Farmer Share (50%) in PKR</b>			<b>653,772</b>

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Bill of Material for 10 HP Solar System

Horsepower 10 HP	Solar Power 10.40 Kw	Area 10 Acres		
No	Component	Quantity	Cost	Total Cost
1.	PV Module (Poly/Mono 60/72 cell) Pmax 325 Wp	32	20,150	644,800
2.	Pump Controller/Variable Frequency Drive (11 KW)	1	205,000	205,000
3.	Solar Panel Array Structure with civil work	4	100,000	400,000
4.	Electrical Cables (AC Cable 6mm 3 core voltage rating 440 V)	30	440	13,200
5.	Electrical Cables (DC Cable 4mm single core voltage rating 1000 V)	200	247	49,400
6.	AC Breaker 16A, 3 poles	1	3,510	3,510
7.	DC Breaker 16A, 2 poles	2	6,626	13,252
8.	Breaker Box & changeover switch	1	12,000	12,000
9.	Earthing & Grounding (According to Electricity act of Pakistan) including borehole, earthing rod, earthing powder etc.	1	per site	20,000
10.	Survey, Design & Estimate	1	5,000	5,000
11.	Transportation	1	35,000	35,000
12.	Installation	-	55,000	55,000
13.	Post Installation O&M	6.00%		87,370
14.	<b>Sub Total Cost in PKR</b>			<b>1,543,532</b>
15.	<b>Total Project Cost PKR</b>			<b>1,543,532</b>
16.	<b>Per KW Cost in PKR</b>			<b>148,417</b>
17.	<b>Per Acre Cost in PKR</b>			<b>154,353</b>
18.	<b>Government Share in PKR (50%)</b>			<b>771,766</b>
19.	<b>Farmer Share (50%) in PKR</b>			<b>771,766</b>

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Physical and Financial Phasing of the proposed project

Sr. No.	Particulars	Units	2019-20	2020-21	2021-22	Total
<b>I. Physical Activities</b>						
A.	Installation of Solar Systems for Operating HEIS	Acres	6,000	10,000	4,000	20,000
<b>II. Financial Outlay (Rs. Million)</b>						
<b>A05120</b>						
A.	Installation of Solar Systems for Operating HEIS					
	i) Government Share (50%)	0.0875	525.000	875.000	350.000	1,750.000
	ii) Farmers' Contribution (50%)	0.0875	525.000	875.000	350.000	1,750.000
	<b>Sub-Total (A)</b>	0.1750	<b>1,050.000</b>	<b>1,750.000</b>	<b>700.000</b>	<b>3,500.000</b>
<b>A06470</b>						
B.	Project Supervision & Monitoring Consultants		<b>70.097</b>	<b>54.711</b>	<b>53.572</b>	<b>178.379</b>
	<b>(i) Government Share</b>		<b>595.097</b>	<b>929.711</b>	<b>403.572</b>	<b>1,928.379</b>
	<b>(ii) Farmers' Contribution</b>		<b>525.000</b>	<b>875.000</b>	<b>350.000</b>	<b>1,750.000</b>
	<b>Total Project Cost</b>		<b>1,120.097</b>	<b>1,804.711</b>	<b>753.572</b>	<b>3,678.379</b>

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Calculation of Financial Internal Rate of Return (FIRR)

(Rs. Million)						
Year	Project Economic Costs			Project Benefits	Economic Benefits	Net Benefits
	Investment	O&M	Total			
1	1,120.10	0.00	1,120.10	198.00	198.00	(922)
2	1,804.71	100.81	1,905.52	858.00	858.00	(1,048)
3	753.57	263.23	1,016.80	1,122.00	1,122.00	105
4	-	33.11	33.11		1,122.00	1,089
5	-	33.11	33.11		1,122.00	1,089
6	-	33.11	33.11		1,122.00	1,089
7	-	33.11	33.11		1,122.00	1,089
8	-	33.11	33.11		1,122.00	1,089
9	-	33.11	33.11		1,122.00	1,089
10	-	33.11	33.11		1,122.00	1,089
11	-	33.11	33.11		1,122.00	1,089
12	-	33.11	33.11		1,122.00	1,089
13	-	33.11	33.11		1,122.00	1,089
14	-	33.11	33.11		1,122.00	1,089
15	-	33.11	33.11		1,122.00	1,089
16	-	33.11	33.11		1,122.00	1,089
17	-	33.11	33.11		1,122.00	1,089
18	-	33.11	33.11		1,122.00	1,089
19	-	33.11	33.11		1,122.00	1,089
20	-	33.11	33.11		1,122.00	1,089
21	-	33.11	33.11		1,122.00	1,089
22	-	33.11	33.11		1,122.00	1,089
23	-	33.11	33.11		1,122.00	1,089
24	-	33.11	33.11		1,122.00	1,089
25	-	33.11	33.11		1,122.00	1,089
NPV of Costs		3,556.5				
NPV of Benefits		8,494.0				
B/C ratio		2.4				
FIRR		36.0%				

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Calculation of Economic Internal Rate of Return (EIRR)

(Rs. Million)						
Year	Project Economic Costs			Project Benefits	Economic Benefits	Net Benefits
	Investment	O&M	Total			
1	1,008.09	0.00	1,008.09	198.00	166.32	(842)
2	1,624.24	90.73	1,714.97	858.00	720.72	(994)
3	678.21	236.91	915.12	1,122.00	942.48	27
4	-	29.79	29.79		942.48	913
5	-	29.79	29.79		942.48	913
6	-	29.79	29.79		942.48	913
7	-	29.79	29.79		942.48	913
8	-	29.79	29.79		942.48	913
9	-	29.79	29.79		942.48	913
10	-	29.79	29.79		942.48	913
11	-	29.79	29.79		942.48	913
12	-	29.79	29.79		942.48	913
13	-	29.79	29.79		942.48	913
14	-	29.79	29.79		942.48	913
15	-	29.79	29.79		942.48	913
16	-	29.79	29.79		942.48	913
17	-	29.79	29.79		942.48	913
18	-	29.79	29.79		942.48	913
19	-	29.79	29.79		942.48	913
20	-	29.79	29.79		942.48	913
21	-	29.79	29.79		942.48	913
22	-	29.79	29.79		942.48	913
23	-	29.79	29.79		942.48	913
24	-	29.79	29.79		942.48	913
25	-	29.79	29.79		942.48	913
NPV of Costs		3,200.9				
NPV of Benefits		7,135.0				
B/C ratio		2.2				
EIRR		32.8%				



## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Assumptions for Project Indicators

Design	Performance Targets / Indicators with baseline Values	Data Sources and Reporting	Assumptions
<b>Impact</b>	Increase in water productivity i.e. output per unit of water used (kg/ m <sup>3</sup> )	Impact Assessment Reports by Consultants and the OFWM	1.5
<b>Outcome</b>	<ul style="list-style-type: none"> <li>• Reduction in operational cost (%)</li> <li>• Saving in energy cost (PKR/KWH)               <ul style="list-style-type: none"> <li>➤ Electric</li> <li>➤ Diesel</li> <li>➤ Solar</li> </ul> </li> <li>• Increase in crop yield (%)</li> <li>• Reduction in CO<sub>2</sub> emission (tones/acre/annum)</li> </ul>	Evaluation and Impact Reports by Consultants and the OFWM	60  8.00 25.00 7.00  35  0.61
<b>Outputs</b>	<ul style="list-style-type: none"> <li>• Number of Solar operated HEIS installed</li> <li>• Number of indirect beneficiaries in rural areas</li> </ul>	Project Reports by Consultants and the OFWM	2,000  10,000

# Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

## Terms of Reference (TORs)

### of

## Project Supervision and Monitoring Consultants

### 1. Background

1.1 Agriculture is a crucial driver of economic development in Punjab. It contributes a quarter to Punjab' GDP and about half of total provincial manpower depends on agriculture for their livelihood (Figure-1). Punjab is country's agricultural and economic heartland that contributes to about 80 percent of country's food requirements by producing 80 percent cotton, almost 70 percent wheat, nearly 60 percent sugarcane, and around 50 percent rice. More than 70 percent cropped area of the Pakistan's Indus food machine is situated in the Punjab and over 90 percent of province's agricultural production comes from irrigated lands. About two third of the population residing in rural areas rely directly or indirectly on this sector for their livelihood. Despite critical significance of irrigated agriculture to national as well as provincial development, it could not perform sustainably mainly due to lack of modernization of agricultural operations leading to colossal loss of precious inputs resulting in low productivity.

1.2 There is substantial variation in crop yields and corresponding water productivities of different crops as well as for the same crop grown in different parts of the world. This gap can be attributed to many factors including use of modern technologies, effective input management, balanced fertilizer applications, effective insect/ pest management etc. The efficacy of all these measures, however, largely depends upon water availability and its efficient use. It is pertinent to point out that the agriculture in Pakistan is based mostly on traditional non-scientific farming methods, which are the main cause of low crop and water productivity. There is huge scope for improving water productivity at the farm level through adoption of modern and more productive irrigation technologies for optimal use of inputs, particularly water, fertilizer and energy.

1.3 Owing to above challenges, adoption of climate smart sustainable technologies is need of the hour. The interventions envisaged under the proposed project would entail promotion of a Hi-Tech technologies including solar system for enhancing crop yields, increasing farm incomes, improving livelihood of people, enabling farmers to adjust the agricultural practices with varying environments, promoting renewable energy sources and alleviating poverty in the province.

1.4 The major activities to be carried out under the proposed project would include, inter alia, the followings.

- a) Creation of awareness and mobilization of farmers to adopt Hi-Tech agriculture technologies for crop and water productivity enhancement.
- b) Provision of Solar Systems to the farmers for operating High Efficiency Irrigation Systems on **20,000** acres.

### 2. Project Location/Area:

The project activities would be implemented in the entire Punjab including canal irrigated and non-canal commanded areas of the province.

### 3. Objectives of the Assignment

Consultancy services for Project Supervision and Monitoring (PSM) are required to ensure that the activities envisaged under the project are executed in an orderly manner with a high standard of workmanship and specified quality of materials within the envisaged implementation period and in conformity with best possible and latest technical, social and environmental standards. The objectives of PSM consultancy services include, but not limited, to:

### 3. Scope of Services

3.1 The task and the activities of Project Supervision and Monitoring Consultants would include, but not limited to the following.

- I. Review the designs and standards & specifications for installation of solar system for operating high efficiency irrigation systems.
- II. Monitor all project activities including technical, environmental, social, economic aspects etc. to evaluate actual achievement against the activities planned in the PC-I;
- III. Provide support in procurement process including pre-qualification of supply and service companies (SSCs), invitations of bid, evaluation of bids and make recommendations as well as prepare all relevant documents for award of contracts;
- IV. Maintain detailed technical record and financial accounts & other project records and prepare other documentation as may be required by the client and government of the Punjab;
- V. Extend technical support for maintaining information related to project activities regarding facilities/ services, applications, procedures, progress etc.;
- VI. Assist in procurement, financial, social and environmental management of project activities;
- VII. Prepare Terms of Reference (TORs) for carrying out any additional studies, recruitment of SSCs etc;
- VIII. Liaise with provincial, divisional, district and tehsil offices for smooth execution of field activities;
- IX. Notify the Director General Agriculture (Water Management) Punjab/ Project Director about compliance/ non-compliance of works against agreed criteria and standards & specifications;
- X. Prepare daily, monthly, quarterly, and annual progress & monitoring reports for proposed project activities besides other periodic reports as per requirements of project management;
- XI. Provide support for contract management and preparation of contract documents as required by the Client (Government of Punjab);
- XII. Check the completed works, carry out measurements, estimate the cost & payments, certify the payments, and quality of the works in accordance with the approved standards and specifications as a third party;
- XIII. Carry out impact evaluation of project activities to assess the project benefits;
- XIV. Implement the overall monitoring and evaluation plan including collecting, analyzing, and reporting project data for continued effective tracking of project objectives; and
- XV. Support in project management based on modern concepts, implementation of works, implementation of the communication strategy and plan, support to Director General Agriculture (WM) Punjab/ Project Director for preparation of project implementation plans, expenditure planning, budgeting and financing forecast and work plans, as required by the government and financing agency(s) of the project as well as assistance in developing the procurement plans, contract management, and financial management.

**Specific Scope of Services:** The Project Supervision & Monitoring Consultants (PSMC) will be responsible for supervision and monitoring of all contracts and in this context will carry out, but not limited to the following activities:

- i) Review the designs of the solar systems for operating HEIS.
- ii) Advice on standards, specifications and criteria for solar system coupled with HEIS best suited to local conditions including solar photovoltaic modules/ panels, inverter/ pump controller, electric cables for solar array wiring, solar panel structure and integration with pump sets.
- iii) Review and approve the design of solar array structure drawing, its material, diameter of pipes used and thickness of various items.

- iv) Review and approve the required civil work to support solar array structure to carry out required load to withstand high wind velocity.
- v) Provide technical assistance in preparation of the design and specification, and cost estimation of the solar systems coupled with HEIS. Provide guidelines, data, information and criteria on which the SSCs would base their designs that would be acceptable for the project and to the PSMCs.
- vi) Prepare technical documents/ agreement for SSCs including contract conditions, specifications for design, materials and installation of equipment itemized list of typical items etc.
- vii) Monitor installation of solar system in accordance with approved criteria.
- viii) Assistance in evaluation/ prequalification of the technical and financial proposals of SSCs.
- ix) Assistance mobilization and screening of farmers.
- x) Facilitate in selection of high quality brands of solar panels inverter/pump controller, cables, pump sets etc.
- xi) Facilitate in finalization in rates for various items and services required for solar system installation.
- xii) Review and approve plans, designs, cost estimates prepared by the SSCs for solar system
- xiii) Prepare proformas for ICR-I (material verification report) and ICR-II (final completion report)
- xiv) Check for quality of material delivered at the site by SSCs and carried out works in conformity with specified standards and quantities based on an agreed quality assurance plan.
- xv) Certify quantities and quality of all completed works for payments of solar systems cost to SSCs.
- xvi) Help I procurements of equipment required for testing of solar system after installation including irradiance meter, PV analyzer, micrometer, hot dip galvanization thickness checking equipment etc.
- xvii) Prepare completion and certification reports of the completed works including those completed before effectiveness of contract agreement.
- xviii) Perform the following during site visits in the process of installation of solar system.
  - xix) Selection of location for installation of solar system & approval of design
  - xx) Material verification and spot check at the time of foundation civil work
  - xxi) Commissioning
  - xxii) Revisit of deferred site after rectification of shortfalls (one visit is included) Subsequent visit (s) to be charged to SSCs through the department
- xxxvi) Provide technical support for training of stakeholders including farmers and OFWM staff in solar system design, installation, operation & maintenance etc.
- xxxvii) Facilitate timely completion of planned works and recommend onsite design modifications.
- xxxviii) Verify financial resource transfer applications at various stages of work execution; and
- xxxix) Prepare design, operation, maintenance and management manuals for solar systems for operating HEIS.

3.2.1 In the event of contractual dispute which may result in legal action, adjudication or arbitration between the contractor/supplier and the Client, on the instruction from the Client, the Consultants will collate and prepare factual documentation which describes the circumstances of the dispute. The Consultants will attend hearings and provide all legal and other support to the Client.

3.2.2 They will be designated as the Engineer and undertake agreements in respect of equipment to be procured (solar system), and will be responsible for inspection of equipment in order to ensure that equipment supplied are in accordance with designs, specifications and terms & conditions of the relevant contracts and standards. The consultants shall ensure that procurement of works and equipment are in accordance with the relevant guidelines of government of the Punjab and managed properly including any changes or variation orders during implementation.

3.2.3 Third Party Validation Support: The consultants will provide support to Director General Agriculture (Water Management) and Project Director in overall project management &

monitoring activities such as preparation of project implementation plans, expenditure planning, budgeting and financing forecast and plans, monthly, quarterly and annual progress reports or work programs as required by the Client and Government of the Punjab. They will also help in developing the procurement plans, contract management, and financial management. The plans will be updated on a regular basis as required by Client. The overall role of consultants is third party validation of project works and monitoring of project activities.

3.2.4 Management of information on the Website. The consultants would assist DGA (WM)/ Project Director for placing data on the website and its management. All project related information including procurement, work plan, project progress, works in progress, works completed etc. would be placed on the website.

#### 4. Team Composition & Qualification Requirements for the Key Experts

4.1 The consultants are encouraged get the international expertise as well as available in Pakistan to the extent possible. However, international experience of similar project is necessary to carry out the assignment. The consultants are free to propose a staffing plan and skill mix in order to ensure that necessary requisite objectives and scope of services are achieved. If all the required skills are not available within the consulting firms, they are encouraged to make joint ventures with other firms. The Consultants shall ensure deployment of qualified competent staff to supervise and monitor installation of solar system coupled with high efficiency irrigation systems. The team of experts required for the project implementation consultancy must have sufficient field experience of the related activities preferably use of solar for farm level development projects.

4.2 Following is the indicative core team of expert's alongwith minimum academic qualification, experience and requisite input for the assignment:

Sr. No	Position	Qualification	General / Overall Experience (Years)	Job Specific Experience (Years)	Tentative Input (Man Month)
1.	Project Manager/ Team Leader (One Position)	Master's Degree or its equivalent in Agricultural Engineering / Electrical Engineering/ Water Resources Engineering or Management/ Project Management	15	10 (Multi-sectoral Agriculture Development /Water Resources/ Renewable Energy Projects)	36
2.	Renewable Energy Expert/ Deputy Team Leader (One Position)	Master's Degree or its equivalent in Electrical Engineering / Mechatronics/ Electronics/ Renewable Energy	10	7 (Renewable Energy/ Solar System)	30
3.	Field Engineer (9 Positions)	B.Sc. Agricultural Engineering	3	2 (Solar Systems/ Solar Coupled	324
4.	Monitoring and Evaluation Specialist (One Position)	Master's Degree in Agricultural Engineering/ Water Resources Engineering/ Agriculture Development related studies	10	5 (M&E of Agriculture Development Projects )	30
<b>Total</b>					<b>420</b>

Note: The client has the right to increase/ decrease the input of any experts as and when required.

4.3 Indicative Duties / Job Description of Project Supervision & Monitoring Consultants (PSMCs) Core Team of Experts is given as under.

##### 1. Project Manager/Team Leader

The Team Leader/ Project Manager will possess a Master's Degree or its equivalent in in Agricultural Engineering / Electrical Engineering/ Water Resources Engineering or Management with 15 years' experience including implementation of multi sectoral Agriculture Development/ Water Resources/ Renewable Energy Projects. A minimum of 10 years of job specific experience will be required in the management of similar consultancy services with demonstrated ability to work with government officials, technical field staff, and farmers. In addition, the Team Leader would be required to have familiarity with the principles and

practices of participatory community development, irrigated agriculture, water management related issues, and knowledge of project management information systems besides, having fluency in spoken and written English. Responsibilities of the Project Manager/Team Leader will be but not limited to the following:

- i) Report to the Client.
- ii) Assume overall responsibility for management of the supervision and monitoring team.
- iii) Work as the "the Engineer" as per Client's agreement with the beneficiary farmers/service providers to supervise installation/equipment delivery with the best professional and consulting standards to ensure that the scheme/task is completed satisfactorily.
- iv) Keep the Client informed of technical issues and the progress of all works both by direct contacts and through discussions or correspondence.
- v) Attend, at project level, all meetings as required and keep a record of all such meetings.
- vi) Assist the Client in any project related issue.
- vii) Ensure preparation of all types of project reports and project completion reports.
- viii) Assist the Client in preparing the response to the Audit Objections.
- ix) Lead the M&E consultant's team for provision of technical assistance to Director General Agriculture (WM) in the Punjab.
- x) Coordinate with all related Client's organizations for project issues.

Project manager/ Team leader will be stationed at Lahore and must be available for the job on full time and available at any time for meeting with the Client.

## **2. Renewable Energy Expert /Deputy Team Leader**

The Deputy Team Leader/ Renewable Energy Expert will possess a Master's degree or its equivalent in Electrical Engineering / Mechatronics/ Electronics/ Renewable Energy with 10 years of experience. A minimum of 7 years of experience will be required in renewable energy/ solar system projects with demonstrated ability to work with government officials, technical field staff and farmers. Work experience in related computer tools, international as well as government of the Punjab rules/procedures, good communication skills, fluency in English and proven satisfactory record of similar consultancies would be preferred. Responsibilities of Deputy Team Leader/ Renewable Energy Expert will be but not limited to the following:

- i) Report to Project Manager/Team Leader and in his absence to the Client.
- ii) Act as deputy to Project Manager and carry out the duties of Project Manager/Team Leader except those of "the Engineer" in his absence.
- iii) Assist the Project Manager/Team Leader in coordination issues.
- iv) Represent the Project Manager/Team Leader in all meetings in his absence or if requested.
- v) Assist the Project Manager in keeping the Client informed of technical issues both by direct contacts and through discussions or correspondence.
- vi) Assist the Project Manager/Team Leader in preparation of monthly, quarterly and mid-term reports.
- vii) Support the Project Manager/Team Leader in any project issue which the Project Manager may require.
- viii) Support the Project Manager in preparation of the project completion report (PCR) and any other duty/assignment, the Project Manager may entrust.
- ix) Compile, analyze and process the reports received from subordinate offices.
- x) Carry out field visits to provide necessary input to management about project implementation.

- xi) Lead the design engineering team for solar systems and supervise checking/verification of surveys, design of solar systems as well as other field activities to be performed by the consultants.
- xii) Ensure adoption of international/ national standards for designs and installation of project activities.
- xiii) Arrange verification of physical works and make recommendations for improvements in management modalities for smooth execution of field activities, where required.

### **3. Field Engineer**

The Field Engineer should possess a Bachelor degree in Agricultural Engineering/ Bachelor degree in Electrical Engineering with three (3) years of work experience including at least two (2) years in solar systems/ solar coupled HEIS technology. Work experience in related computer tools, good communication skills, fluency in English and proven satisfactory record of similar consultancies would be preferred. Responsibilities of the Field Engineer will be but not limited to the following:

- i) Coordinate and supervise the project activities including installation of solar systems.
- ii) Review survey, designs and cost estimates and approve the same for site specific installation.
- iii) Ensure quality as well as quantity of works by spot-checking.
- iv) Certify release of funds for ongoing as well as completed works.
- v) Bring any deficiency into the notice of the controlling officers of district and provincial governments.
- vi) Develop close liaison with project stakeholders including project management, SSCs and farmers.
- vii) Any other relevant duties assigned by the project management.
- viii) One Agriculture Engineer and one Electrical Engineer will be posted in each division full time.

### **4. Monitoring and Evaluation (M&E) Specialist**

The Monitoring and Evaluation (M&E) Specialist should possess a Master's degree in Agricultural Engineering/ Water Resources Engineering/ Agriculture Development related studies with 10 years of work experience including at least 5 years' experience in M&E of agriculture development/ modern technology projects. Work experience in related computer tools, good communication skills, fluency in English and proven satisfactory record of similar consultancies would be preferred. Responsibilities of the Monitoring and Evaluation (M&E) Expert will be but not limited to the followings.

- i) Lead the monitoring and evaluation team of the consultants for monitoring of project activities.
- ii) Supervise implementation of overall monitoring and evaluation plan including collecting, analyzing, and reporting project data for continual effective tracking of project objectives.
- iii) Carry out impact evaluation of project activities to assess the project benefits;
- iv) Monitor the installation process of solar system for operating HEIS as well as to ensure implementation of project activities in accordance with the prescribed standards, specifications, and parameters.
- v) Carry out continuous monitoring of the designing plans and maintain liaison with implementation staff/ other stakeholders.
- vi) Assist in reviewing and modifying the project activities for cost effectiveness and technical suitability.
- vii) Ensure adoption of international/ national standards for monitoring of project activities.
- viii) Perform other duties as assigned by the Client.

Monitoring & Evaluation Specialist will be stationed at Lahore and must be available for the job on full time.

## 5. Duration of the Assignment

5.1 The gestation period of project is three years (2019-20 to 2021-22). The estimated period for engagement of consultants is about 36 months i.e. upto June 2022.

## 6. Reporting Requirements and Time Schedule for Deliverables

6.1 Reporting: The consultant will prepare the following reports in English and provide the copies as per sub para 6.2 regarding Deliverables and Schedule, alongwith respective soft copy:

- An inception report;
- Daily progress report;
- Monthly Progress reports;
- A mid-term report on the format acceptable to the Client;
- Quality Assurance Plan - (QA/QC Manual);
- Mid-Term Project Impact Assessment Report
- Revised Planning Commission Proforma-I (PC-I);
- Completion Report;
- Overall impact Assessment Report
- Any special reports as may be necessary from time to time for specific item / issue within the scope of the assignment.

6.2 Deliverables & Schedule: The schedule for various reports, the consultants are likely to prepare is given below. Additional reports have to be prepared as needed. The consultants will supply the deliverables as per schedule given below:

Sr.#	Document	Copies	Due
1.	Draft Inception Report	5	3 weeks after the effectiveness of the Consulting Services Agreement
2.	Final Inception Report	15	One week after the issuance of comments by the Client on Draft Inception Report
3.	Daily Progress Report	1	Daily before 10:00 am through email
4.	Monthly Progress Report (Physical & Financial)	10	10 <sup>th</sup> of the following month
5.	Quality Assurance Plan (QA/QC Manual)	10	Before starting the physical activities
6.	Quarterly Progress Report (Physical & Financial)	10	10 <sup>th</sup> of the first month of following quarter
7.	Annual Summary Progress Report (Physical & Financial)	10	10 <sup>th</sup> of the first month of following year
8.	Annual Progress Report (Physical & Financial)	10	During first month of the following year
9.	Quality Control / Assurance Report	10	After each year
10.	Mid-Term Project Impact Assessment Report	10	Before June 2020
11.	Revised Planning Commission Proforma-I (PC-I)	25	As and when required
12.	Draft Assignment Completion Report	5	At completion of physical works/activities
13.	Final. Assignment Completion Report	25	At completion of works as well as financial transactions
14.	Planning Commission Proforma IV (PC-IV)	50	At completion of project activities
15.	Overall Impact assessment Report	25	At completion of project activities
16.	Complete inventory of works/ activities	10	At completion of the project
17.	Special Reports	10	As and when required

## 7. Professional Liability

The consultants would be responsible for professional liability as per rules & regulations and relevant guidelines of Government of the Punjab as well as the followings.

- i. The consultant selected and awarded a contract shall be liable for consequence of errors or omissions on the part of the consultant.



- ii. The extent of liability of the consultant shall form part of the contract and such liability shall not be less than remunerations nor shall it be more than twice the remunerations.
- iii. The procuring agency may demand insurance on part of the consultant to cover the liability of the consultant and necessary costs shall be borne by the consultant.
- iv. The consultant shall be held liable for all losses or damages suffered by the procuring agency on account of any misconduct by the consultant in performing the consulting services.

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Project Supervision and Monitoring Consultants Summary of the Consultancy Cost

<b>Project Supervision and Monitoring Consultants</b>				
<b>Component</b>	<b>2019-20</b>	<b>2020-21</b>	<b>2021-22</b>	<b>Cost (Pak Rupees)</b>
Remuneration	34,200,000	34,200,000	34,200,000	102,600,000
Reimbursable	25,043,200	12,040,000	11,076,800	48,160,000
<b>Sub Total</b>	<b>59,243,200</b>	<b>46,240,000</b>	<b>45,276,800</b>	<b>150,760,000</b>
Contingencies 2% (Escalation & Unforeseen)	1,184,864	924,800	905,536	3,015,200
Total Cost without GST	60,428,064	47,164,800	46,182,336	153,775,200
GST (16%)	9,668,490	7,546,368	7,389,174	24,604,032
<b>Total Cost with GST (Rs.)</b>	<b>70,096,554</b>	<b>54,711,168</b>	<b>53,571,510</b>	<b>178,379,232</b>

## Promotion of High Value Agriculture through Solarization of Drip and Sprinkler Irrigation Systems

### Risk Identification and Management Plan

Sr. No.	Risk	Risk Ratings	Risk Identification and Mitigation
1	Availability of funds for implementation of project activities.	High Risk (H)	Timely release of funds by government as availability of project funds from ADP would be critical in implementation of project activities as it has been planned that solar will only be provided to the farmers who have installed HEIS or willing to install HEIS.
2	Improper marketing of the produce	Substantial Risk (S)	Marketing of the produce is vital for getting proper rates of the vegetables. If farmers may produce the vegetables but couldn't get the proper rates, which substantially impact the project economics.
3	Prequalification of firms/ supply & service companies	Substantial Risk (S)	There is lack of capacity in the private sector for designing/ installation of HEIS coupled solar system, which may delay implementation of project activities. Accordingly, private sector SSCs may be asked to develop their capacity to cater project requirements. Progress of pre-qualified SSCs will be reviewed yearly and appropriate action will be taken against those, who could not perform as per standards and specification of the department.



**NO.12(9) PO(COORD-II)P&D/2019**  
**GOVERNMENT OF THE PUNJAB**  
**PLANNING & DEVELOPMENT BOARD**  
**Dated Lahore the 16<sup>th</sup> October, 2019**

**Off # 042-99059302**

1. The Secretary to Government of the Punjab,
  - i. Finance Department.
  - ii. Agriculture Department.
  - iii. Environment Protection Department.
2. The Chief Economist /Joint Chief Economist /All Members, P&D Board.
3. The Director, Punjab Economic Research Institute (PERI)
4. The Director General, Monitoring & Evaluation (M&E)
5. The Chief Executive Officer, Urban Unit, Lahore.

Subject: **MINUTES / DECISIONS OF THE MEETING OF PROVINCIAL DEVELOPMENT WORKING PARTY (PDWP). (SECTOR: AGRICULTURE)**

I am directed to enclose herewith a copy of minutes of the **14<sup>th</sup> PDWP meeting held on 24<sup>th</sup> September, 2019** under the chairmanship of Chairman P&D Board, for information and further necessary action of the following schemes:-

Agenda Item No.	Name of the Scheme	ADP No. (2019-20)	Approved Cost (Rs. in million)
<b>05</b>	Rehabilitation of Eroded, Gullied Land through Soil Conservation Measures in Hill Torrent Area of Southern Punjab.	4848 (New)	<b>367.120</b>
<b>06</b>	Promotion of High Value Agriculture through Solarization of Drip & Sprinkler Irrigation Systems.	4864 (New)	<b>3,678.379</b>

*Naveed*  
**(SYED NAVEED IQBAL)**  
**ASSISTANT CHIEF (COORD-II)**

A Copy, along with copy of the minutes, is forwarded to the :-

Sr.No.	PARTICULARS
	<b>PLANNING &amp; DEVELOPMENT BOARD, LAHORE</b>
1	Chiefs: Agriculture, ECA, Technical and Monitoring
2	Manager MIS to update status of the schemes on the SMDP portal
3	PSO to Chairman, P&D Board
4	PS to Secretary, P&D Board
	<b>C.C.</b>
5	Chief (Food & Agriculture) Planning Dev. & Reform Division, Govt. of Pakistan, "P" Block, Pak Secretariat, Islamabad.
6	Deputy Secretary (Staff Officer) to Chief Secretary, Punjab

*Naveed*  
**ASSISTANT CHIEF (COORD-II)**

NO.SOA (P) 09-11/2006  
GOVERNMENT OF THE PUNJAB  
AGRICULTURE DEPARTMENT  
Dated: 18-10-2019

A copy is forwarded for information and further necessary action to:

1. The Director General Agriculture (WM), Punjab, Lahore
2. The Director General Agriculture (Field), Punjab, Lahore

  
SECTION OFFICER (PLANNING)

**GOVERNMENT OF THE PUNJAB  
PLANNING & DEVELOPMENT BOARD  
(Agriculture Section)**

**MINUTES OF 14<sup>th</sup> PDWP MEETING HELD ON SEPTEMBER 24<sup>th</sup>, 2019 UNDER  
THE CHAIRMANSHIP OF CHAIRMAN, P&D BOARD**

**List of participants is attached**

**AGENDA ITEM # 6: PROMOTION OF HIGH VALUE AGRICULTURE THROUGH  
SOLARIZATION OF DRIP & SPRINKLER IRRIGATION  
SYSTEMS**

Chief Agriculture, P&D Board briefed PDWP that Administrative Department initiated the 1<sup>st</sup> Phase of the subject project in FY 2016-17 to 2018-19 at a cost of Rs.3475.00 million. The instant project (IInd Phase) as the previous one has been designed upon the lessons learnt from the experience of execution of High Efficiency Irrigation System (HEIS), a component of the World Bank funded PIPIP Project. An area of 120,000 acres was targeted under HEIS (Drip and Sprinkler Irrigation System) but due to adverse impact of high energy cost to energize the System, the adoption of HEIS among the farmers was very slow. Therefore, HEIS in the Ist Phase of the Project was introduced in which System was energized through solar system (along with providing farming tunnels). The Project was funded through ADP at a cost sharing of 80:20. Now, keeping in view the success story of Phase-I, Administrative Department has submitted the instant project as Phase-II. The instant project is designed only for the provision/installation of solar system on 20,000 acres of land for operating drip and sprinkler irrigation system at the proposed cost of Rs.3,750.379 million with gestation period from 2019-20 to 2021-22 on basis of matching grant.

2. Chief (Agriculture) further apprised that Administrative Department has a pool of technically prequalified firms which have been engaged for other similar project. The Department intends to utilize these pre-existing prequalified firms for the instant project. Chairman P&D Board showed serious concern to carry on the already prequalified firms for the instant project and said that to achieve better competition the process should be conducted a fresh. He also saw no justification for allocating Rs.72 million for Physical & Price Contingency that may be deleted.

3. Member PSW apprised the Chair that an open competition appears to be deficient for arriving at a cost for any specific site project. It is left entirely to the beneficiary farmers and the prequalified firms to negotiate the final cost of site specific project. He was of the view that this arrangement does not appear to be competitive and Administrative Department may explain it. DG Water Management responded that rates were already competitive and have been concluded after soliciting proposals from all stakeholders, especially the prequalified firms. The final cost for any specific project is left to the beneficiary farmers and since he has stakes in it, he negotiates a reasonable cost for his project bringing it further down.



Member PSW remarked that although AD was solely responsible for procurement process, however, it may satisfy itself that PPRA Rules are observed. Chair, while endorsing the views of Member PSW constituted the following Committee to look into the issue of procurement / prequalification process for ensuring better value of money spent;

i. Secretary P&D Board	Convener
ii. Secretary Agriculture Department	Member
iii. Member PSW P&D Board	Member

4. A meeting with Administrative Department was convened on 25.9.2019 in the office chamber of Member PSW, P&D Board. It was informed by the Department that following procurement process was followed to get the work done;

- i. Service & Supply Companies are technically prequalified.
- ii. AD determines baseline cost of project components by calling rates from the market, input of the prequalified firms, MRS rates which are available, etc.
- iii. Baseline cost of materials / equipments and the details of prequalified firms are shared with farmers. It is left up to the farmers to negotiate the final cost of any site specific intervention.

The procurement process was discussed. It was clarified to AD that it was the sole responsibility of Administrative Department to see whether the prequalification / procurement process followed was competitive and has the potential to achieve best value for money. It was proposed to Secretary P&D Board that Administrative Department may look into the procurement / prequalification process to ascertain whether fresh prequalification was required and see that project was complex in nature as to warrant prequalification of firms.

5. Foregoing in view following decisions were made;

#### **DECISION**

The project was approved at cost of Rs. 3678.379 M with gestation period of 2019-20 to 2021-22 subject to the following conditions:-

- a) The process of prequalification of firms may be initiated afresh for the instant project and ensure that procurement process is as per the PPRA Rules.
- b) The funds earmarked for physical and price contingency shall stand deleted.



**LIST OF PARTICIPANTS**  
**Of 14<sup>th</sup> PDWP Meeting Held on 24.09.2019**

<b>PLANNING &amp; DEVELOPMENT BOARD</b>		
1.	Mr. Habib-ur-Rehman Gilani	Chairman, P&D Board (In chair)
2.	Mr. Imran Sikandar Baloch	Secretary, P&D Board
3.	Mr. Mahmood Hassan	Member (PSW)
4.	Mr. Sohail Saqlain	Member (Health, Nutrition & Population)
5.	Mr. Sadaqat Hussain	Member (Energy)
6.	Mr. Khalid Sultan	Member (Education)
7.	Dr. Ayesha Saeed	Member (PSD)
8.	Mr. Javid Latif	Senior Chief (Coordination)
9.	Mr. Azhar Ali Khan Rana	Sr. Chief (ECA)
10.	Dr. M. Aman Ullah	Joint Chief Economist (JCE)
11.	Mr. Nusrat Tufail Gill	Chief (Consultancy)
12.	Dr. Muhammad Ashraf	Chief (Agriculture)
13.	Dr. Muhammad Arif Raza	Assistant Chief (Agriculture)
14.	Syed Naveed Iqbal	Assistant Chief (Coord-II)
15.	Mr. Muhammad Rashid	Planning Officer (Coord-II)
16.	Muhammad Ahmad Awan	Research Associate (Agri./Food)
<b>FINANCE DEPARTMENT</b>		
17.	Mr. M. Awais Malik	Deputy Secretary (Infrastructure )
<b>DIRECTORATE GENERAL (M&amp;E)</b>		
18.	Ms. M. Salman	Project Manager
<b>AGRICULTURE DEPARTMENT</b>		
19.	Mr. Zahid Iqbal Gondal	Special Secretary
20.	Engineer M. Afzal	Director General (AF)
21.	Malik M. Akram	DGA (WM)
22.	Mr. Tahir Mehmood	ADT (OFWM)
23.	Mr. M. Sadiq Munawar	FA & LS Specialist
24.	Dr. Ahmad Bilal	DS (Tech)
25.	Dr. Kashif Bashir	Section Officer (Planning)
<b>ENVIRONMENT PROTECTION DEPARTMENT</b>		
26.	Mr. Muhammad Javaid	Deputy Secretary (Tech)

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