**Project completion report • Template**

Project completion report

of [Site name]

Solar irrigation pumps

Project title: [Title]

Project code: [Code]

Date: December 22, 2023

|  |  |
| --- | --- |
| **Prepared by** | **Submitted to** |
| [Company name]  [Company address] | [Company name]  [Company address] |

List of separate attachments submitted along with this report:

1. Copy of user committee registration
2. Letter from the registered user committee confirming satisfactory completion of project construction and recommending the disbursement of subsidy
3. Letter from the company confirming completion of project construction
4. A copy of the price schedule agreed upon between the project promoter and the installer company
5. A copy of the agreement between the project promoter and the installer company
6. Copy of letter provided by GoN for project construction
7. Bills of electromechanical and civil construction
8. Original subsidy request form
9. RETS certificate of the installed solar modules
10. IEC 62253 certificate of the installed solar pump or test report
11. Serial numbers of installed solar modules, pump and controller including photos showing the serial numbers
12. Warranty cards of installed solar modules, pump and controller
13. Equipment datasheets (including protection systems such as lightning arrester, down conductor, earthing etc.)
14. Photos of the site showing solar array, land, users, installer technicians and water pumped
15. Copy of project promoter’s citizenship and land registration certificate
16. As-built engineering drawings
17. Single-line diagram
18. Snapshots of the as-built site map (provide Google Earth .kml file separately)

Glossary

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# EXECUTIVE SUMMARY

*Describe briefly in* ***one page*** *the key features of the project.*

*Paragraph #1*

1. *Site location*
2. *The actual number of households, farmers*
3. *Date when the testing and commissioning was completed*

*Paragraph #2*

1. *Current baseline of project (current irrigation practices, application(s) of water, water source etc.)*

*Paragraph #3*

1. *The coverage area of the solar irrigation pump (ward numbers, area in sq. km)*
2. *System description (solar array capacity, inverter capacity, pump capacity, intake and reservoir tank sizes)*
3. *Average daily water output with descriptions of maximum and minimum with respective seasons*

*Paragraph #5*

1. *Major project risks and mitigations*
2. *Conclusion*

# SITE DETAILS

## Location

*Describe the location of the site and provide information about,*

1. *Site address (ward number, rural municipality, district and province)*
2. *Site coordinates*
3. *User committee information (registered/non-registered, number of members, details of user committee chair)*

*Figure suggestions*

1. *Bird’s eye view of the site with boundary marking*

## Site access

*Describe the accessibility of the site. Provide information about,*

1. *Access route description (vehicle access, type of road/path e.g., earthen, gravel, black-topped*
2. *Observations of population density in the site area (for example, dense households, sparsely populated etc.)*

*Photo suggestions*

1. *Bird’s eye view of the site location within a few hundred meters of ground elevation*
2. *Bird’s eye view of the site location showing pinned site location and the nearest city*
3. *Access road/path*

## Demography

*Describe the demography of the site area. Provide information about,*

1. *Population*
2. *Number of households/farmers*
3. *Household/farmer distribution by ‘toles’ or wards*
4. *Types of the population (ethnicity-wise)*
5. *Income sources of community*

*Photo suggestions*

1. *Agri-enterprises, institutions/existing milling, etc.*

## Security

*Describe the security aspects of the site area from the perspective of the solar pumping system. Provide information about,*

1. *Security of solar array and controller equipment location*
2. *Security of the pump location*

*Photo suggestions*

1. *North, South, East and West view of solar array location*
2. *North, South, East and West view of controller equipment location*
3. *North, South, East and West view of the pump location*

## Telecommunications and internet access

*Describe coverage of mobile network and internet access. Provide information about,*

1. *Best mobile carrier name and internet service provider*
2. *Type of mobile data connection (for example, calls only, 2G only, 3G only, 4G, etc.)*
3. *Reliability of mobile network*
4. *Nearest facility with internet access (for example, ward office, rural municipality office) and its distance from the powerhouse*

## Climate risks during project execution

*Provide information about site observations during project construction about extremities in climate and weather- conditions like flooding, landslide, lightning, etc. that concern the solar pumping system*

## Baseline status of irrigation and agriculture value chain

*Describe the baseline status of irrigation practices on the site and agriculture value chain. Provide information about,*

1. *Baseline status of irrigation practices (means of water for irrigation, technologies for irrigation, etc.)*
2. *Baseline agriculture value chain (commercial or individual farming, selling produce in the nearest market, crop pattern, etc.)*
3. *Any planned or existing irrigation or agriculture value chain support in the site*

# TECHNICAL DETAILS

## Solar array location

1. *Must include the land area, ownership details, GPS coordinates, topography, as-built orientation and azimuth, near and far shading, slope and soil type, wind loading, etc.*
2. *Details of usability with respect to natural calamities such as floods, landslides, lightning, etc.*
3. *Details related to safety from humans, such as fencing*

*Photo suggestions*

*Bird’s eye view of solar array location with boundary markings*

## Controller equipment location (if significantly far from solar array location)

1. *Must include the GPS coordinates.*
2. *Details of usability with respect to natural calamities such as floods, landslides, lightning etc*
3. *Details related to safety from humans, such as housing*

*Photo suggestions*

*Bird’s eye view of controller equipment location*

## Pump location (and collection tank if applicable)

1. *Must include the land area, ownership details, GPS coordinates, topography, etc.*
2. *Details of usability with respect to natural calamities such as floods, landslides, lightning etc.*
3. *Details related to safety from humans, such as housing, security*

*Photo suggestions*

*Bird’s eye view of the pump and collection tank location*

## Reservoir location

1. *Must include the land area, ownership details, GPS coordinates, topography, etc.*
2. *Details of usability with respect to natural calamities such as floods, landslides, lightning, etc.*
3. *Details related to safety from humans, such as fencing*

*Photo suggestions*

*Bird’s eye view of the reservoir location*

## Site layout

1. *Overall project map layout using CAD inclusive of PV array, controller equipment, water collection and reservoir, water T&D etc.*
2. *Measurements of data related to the size, topography, terrain, soil condition, etc. and plotting them using CAD or similar software*

## Utilization of existing infrastructure

*Describe any existing (pre-built) infrastructure that the SIP utilized during construction. For example, existing reservoir tanks etc.*

## Water output

1. *Present the designed daily water output as per the detailed feasibility study. Use a graphical representation to present the water output simulation as per the detailed feasibility study.*
2. *Describe, calculate and show in tables and graphs the measured daily water output of 3 days and present an analysis showing the relationship between the obtained data and the initial design estimations (for example, daily average water discharge with respect to weather conditions, etc.)*

## System architecture

*Present a block diagram and describe the system architecture.*

## As-built single-line diagram

1. *Include labelling of the project name, system size, cable sizes, all the component sizes inc. MCBs, SPDs, etc. along with the legend*
2. *Must show the array, controller, pump, protection equipment, etc.*
3. *Each component used in the SLD must be recognized well despite its size, and the quality and printing layout must be maintained for A3-size paper*

## Shading analysis

## Near and far shading

1. *Mention the criteria, formula, tools etc. used in determining the shading analysis*
2. *Shading analysis of the solar array over 12 months with December 22nd data in focus, simulations (if needed)*
3. *Each row of the proposed array should have its shading analysis done and projected*

## Solar PV array

1. *Modules specifications*
2. *The sizing, design, distribution, and positioning of solar PV array*
3. *Sizing, design and placement of combiner boxes, relevant accessories, earth points, etc.*

## Module mounting structure

1. *Must include an as-built drawing of the module mounting structure*
2. *Calculations related to wind loading requirements, civil foundation details, size of vertical legs, purlins, braces and struts, rafters, base plates, joints, mid-clamps, end clams etc. must be presented*
3. *The type of material proposed, its strength, advantage, selection procedure and other technical parameters and specifications must be mentioned*

## Controller

1. *Must include key specifications and related compatibility with other components primarily array configurations and generation-side DC components*

## Water collection, water reservoir and fencing

1. *Must include the as-built drawings, specification, and civil components description including fencing*
2. *Must include plan and side views showing placements of installed/constructed equipment*
3. *Must include details regarding construction materials, structure analysis, PCC, foundation, etc. meeting statutory regulations, standards and requirements for civil construction, design, and drawings*

## Water transmission and distribution

1. *Must include a table with a summary of design, lengths, pipes used, accessories used, and specifications wherever necessary, etc.*
2. *As-built water T&D details with a calculation sheet of head loss must be provided in the annexes*
3. *Pipe type details – GI, HDPE and other types must be mentioned*
4. *Water T&D will be accompanied by drawings and layout fit for A3 size paper indicating the water T&D over the coverage area, key specifications of components used etc.*

## Metering

1. *Provide details of the water meter at the output of the SIP*
2. *If applicable, detailed specifications and consumer-side water meters*
3. *Provide details of the consumer-side energy meter used. For example, the diameter of water meters.*

## Cables

1. *Details of as-built cable types and sizes used for different sections. For example, UV cable for the outdoors, flexible multistrand cables for the DC side, etc.*
2. *The type of cables e.g., single core, three core, etc. must be mentioned and a chart of cables used in the SIP must be presented*
3. *AC, DC, and communication cables must be distinguished and labelled well in the SLD*

## Protection equipment (MCBs, SPDs, AC/DC combiner boxes, etc.)

1. *Specification including the class, type, etc. of different MCBs for each string (string breakers), DC MCBs for the DC side, AC MCBs for the AC side, SPDs and MCCB on the output must be mentioned*
2. *Specifications of AC/DC combiner boxes must be mentioned*

## Cable route details

1. *The cable route must be shown* *in the overall electrical layout diagram to and from the array and the control equipment*

## Lightning arrestors

1. *Location(s) and specifications (including type and ratings) of lightning arrestors must be mentioned*
2. *All the accessories used in lightning arrestor including the down conductor, pole, etc. must be mentioned*

## Earthing and SPDs

1. *The total number of earthings and their location must be mentioned*
2. *Specifications of earthing pits including materials used during installation must be mentioned (for example, earthing rod material, the chemical used, etc.)*
3. *Earth resistance of each earthing point must be given*

# SAFETY CONSIDERATIONS

1. *Measures that must be taken for the safety of SIP including PV array, controller equipment, pump, water collection and reservoir, etc. must be mentioned*
2. *Precautions and measures operation and management authority, safe handling of SIP components and safe use of appliances must be mentioned*
3. *Other safety measures that must be observed on-site must be mentioned*

# BILL OF QUANTITY (AS-BUILT)

*Provide a table with a list of detailed BoQ as per the design/bidding document. The table below is given as a reference.*

|  |  |  |  |
| --- | --- | --- | --- |
| **SN** | **Item** | **Quantity (as per bidding document)** | **Quantity (as-built)** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## Water tariff

1. *If within the scope of the contract, provide details of the SIP water tariff agreed upon by the community and how it was determined*
2. *Describe the tariff collection mechanism ensuring its reliable and transparent collection and management*

## Community perspective

*Describe the observations made about the community during the construction. Provide information about,*

1. *Awareness of the users about the working of solar irrigation systems (for example, understanding of water output depending on weather conditions, daytime use, understanding that community ownership is key for long-term effective operation of the SIP system, etc.)*
2. *Willingness to pay, understanding of tariff mechanism (if applicable)*
3. *Social cohesion or divisions within the community, social and political conditions, etc.*
4. *Possibility of enhanced agriculture value chain after installation of SIP*
5. *Any social concerns regarding the SIP project*

## Local/Provincial government perspective

1. *Ownership of the project for sustainable and smooth operation*

# CONCLUSION

*Provide a summary of the SIP architecture, construction completion dates, major risks and mitigations, any recommendations for operation and management, etc.*

# ANNEXES

## Letter from the rural municipality (if required)

*Attach a letter from the rural municipality confirming the completion of the project*

## Photos

*At least, include photos of,*

1. *Solar array*
2. *Controller equipment*
3. *Pump*
4. *Water collection and reservoirs*
5. *Water T&D network*
6. *Earthing pits with visible connection points*
7. *Water meter*

## Equipment datasheets

## As-built engineering drawings

## Single line diagram

## Snapshots of the as-built site map

1. *Provide snapshots of the site map demarcating locations of the solar array, controller equipment, pump and the water T&D path*
2. *Provide a Google Earth .kml file separately*