Project completion report template – Solar grid-connected system • Template

Project completion report of [Site name] Solar grid-connected systems

Project title: [Title]

Project code: [Code]

Date: December 20, 2023

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

List of separate attachments submitted along with this report:

1. Letter from the rural municipality (if required)
2. Equipment datasheets
3. As-built engineering drawings
4. Single-line diagram

Glossary

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# Executive Summary

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

*Paragraph #1*

1. *Site location*
2. *Nature of the institution operations (hospital, school, etc.)*
3. *Date when the testing and commissioning were completed.*

*Paragraph #2*

1. *Current load and energy demand*

*Paragraph #3*

1. *The coverage area of the solar mini-grid (ward numbers, area in sq. km)*
2. *System description (solar array capacity, on-grid inverter capacity)*
3. *Annual energy production as per design and objective of the design (captive design, energy sales etc.).*

*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. *Institution information*

*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)*

*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*

## Security

*Describe the security aspects of the site area from the perspective of a solar grid-connected system. Provide information about,*

1. *Security of solar array location*
2. *Security of power conditioning equipment (inverters, distribution boxes, etc.)*

*Photo suggestions:*

1. *North, South, East and West view of solar array location*
2. *North, South, East, and West view of power conditioning equipment 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. *Reliability of internet access*

## 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 grid-connected system.*

## Current status of electricity

*Describe the current status of electricity sources and backups on the site. Provide information about,*

1. *Reliability of the national grid*
2. *Backup electricity generation sources. For example, diesel generators, etc.*
3. *Remarks on any planned expansion of the beneficiary’s facility*

# TECHNICAL DETAILS

## Solar array location

1. *Must include the land/roof area, permission/ownership details, GPS coordinates, topography, as-built orientation, 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.*

## Power conditioning equipment location

1. *Must include the room area, permission details, component fixture details, etc.*
2. *Details related to safety from humans, and unauthorized access*

*Photo suggestions*

*Bird’s eye view of controller equipment location in reference to the solar array location.*

### Site layout

1. *Overall project map layout using CAD inclusive of PV array, controller equipment, solar grid connected output connection point in the distribution board, etc.*
2. *Measurements of data related to the size, topography, terrain, soil condition, roof types, etc. and plotting them using CAD or similar software*

## Utilization of existing infrastructure

*Describe any existing (pre-built) infrastructure that the solar grid-connected system utilized during construction. For example, existing room for controller equipment, etc.*

## Energy generation

1. *Present the designed energy generation as per the detailed feasibility study. Use graphical representation to present GHI, losses, monthly energy generation profiles, etc as per the detailed feasibility study.*
2. *Describe, calculate, and show in tables and graphs the measured daily load analysis for 72 hours (including a weekend) and present an analysis showing the relationship between the obtained data and the initial design estimations (for example, X% self-consumed by the beneficiary’s facility, X% exported, peak power generation and X% of the system capacity, etc.)*

### System architecture

*Present a block diagram and describe the system architecture (for example, grid-connected for captive loads, grid-connected for export, diesel generator synchronization, etc.).*

## 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, inverter, switchgear configuration, 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, power evacuation channels, 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. *Type of material proposed, its strength, advantage, selection procedure and other technical parameters and specifications must be mentioned*

## On-grid inverter(s)

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

## Metering

1. *Provide details of the energy meter at the output of the ACDB*

## Cables

1. *Details of as-built cable types and sizes used for different sections. For example, UV cable for outdoors, flexible multistrand cables for the DC side, XLPE for AC output, etc.*
2. *The type of cables e.g., single core, three core etc. must be mentioned and a chart of cables used in the SMG 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 DC side, AC MCBs for 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 power conditioning equipment*

### Lightning arrestors

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

### Earthing

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 the solar grid connected including PV array, power conditioning equipment, etc. must be mentioned*
2. *Precautions and measures operation and management authority, safe handling of solar grid connected 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** | **Qty (as per bidding document)** | **Quantity (as-built)** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# NET-METER (IF APPLICABLE)

1. *If within the scope of the contract, provide details of the status of net-metering approval with applicable tariff and key conditions.*

# BENEFICIARY PERSPECTIVE

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

1. *Awareness of the beneficiary about solar grid-connected systems (for example, realistic expectations of solar energy generation, reduction in beneficiary’s electricity bills understanding that the beneficiary can confidently rely on solar grid-connected electricity, etc.)*
2. *Understanding of net-metering tariff mechanism (if applicable)*
3. *Any concerns regarding the solar grid-connected project?*

# CONCLUSION

*Provide a summary of the solar grid-connected 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. *Power conditioning equipment*
3. *Combiner and distribution boxes*
4. *Earthing pits with visible connection points*
5. *Energy meter*

## Equipment datasheets

## As-built engineering drawings

## Single line diagram

## Snapshots of the as-built site map

*Provide snapshots of the site map demarcating locations of solar array, power conditioning equipment and the distribution board.*