## Preventive maintenance form – Solar grid-connected system

Scheduled and preventive maintenance is to be done frequently, recommended once every six months, but can be adjusted as per site conditions. The purpose of preventive maintenance is to ensure that the system conditions are always optimal and any anomaly is detected before faults occur.

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| Frequency | Once every six months |
| Resources | Operator or technician |
| Tools required | 1. Basic sets of tools: Wrench set, screwdrivers, etc. 2. Digital multimeter (voltmeter and clampmeter) 3. Measuring tapes 4. Temperature sensor (for measuring the temperature of PV panels, inverter, etc.) 5. Waterproof sealant 6. Any tools required specific to the components used |

The resource person shall use the following checklist during the preventive maintenance checks.

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| Site name: |  |
| Date: |  |
| Location: |  |
| System AC capacity (kW): |  |
| Name of O&M technician: |  |

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| Permit checks | | | |
| Compliances | **Agreement period**  **(refer to agreement)** | **Validity status** | **Remaining duration** |
| Validity of net-metering agreement |  | Valid  Expired | …………….. years  NA |
| Validity of client agreement |  | Valid  Expired | …………….. years  NA |
| Validity of agreement for local O&M personnel |  | Valid  Expired | …………….. years  NA |

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| Description | Inspection | Observation | Action taken |
| General check | | | |
| Power conditioning room(s)  Water ingress: The power conditioning room should be clear of water seepage in walls where electrical equipment is mounted and no water puddles should be near electrical equipment.  Dirt and insects: Components should be clear of dirt deposits and insect infestation. Check cable connecting points for any insect infestation such as spider webs etc.  Unattended objects: Any unattended objects should be cleared from the power conditioning room to keep the area clean and prevent any physical damage. | Is there water seepage in the mounting walls? | Yes  No  If yes, describe seepage:  …………………………… |  |
| Are there water puddles near electrical equipment? | Yes  No  If yes, describe the risk:  …………………………… |  |
| Is the electrical equipment covered in dirt? | Yes  No |  |
| Are there insect infestations in electrical equipment? | Yes  No  If yes, name the equipment:  …………………………… |  |
| Are there any unattended objects near electrical equipment (tools, storage items, etc.)? | Yes  No  If yes, name the object(s):  …………………………… |  |
| By visual inspection, are all MCBs, MCCBs, and fuses in the DC and AC combiner boxes in good condition?  *For example, tripped MCBs, blown fuses, etc.* | Yes  No  If yes, describe the issue:  …………………………… |  |
| Is there any unusual noise observed during inverter operation? | Yes  No  If yes, describe the issue:  …………………………… |  |
| Are the distribution boxes and inverter stand adequately supported? | Yes  No  If yes, describe the issue:  …………………………… |  |
| If any changes were made to the inverter settings, please describe the changes made: | No changes  Changed  Description of changes made:  …………………………… |  |
| Safety  The project site must always be safe to access and provide safe working conditions. Check for any hazards in the area. | Is the roof access safe?  *Example: non-corroded, structure integrity maintained, etc.* | Yes  No  If no, describe the risk:  …………………………… |  |
| Is the access to the power conditioning room safe and clear? | Yes  No  If no, name the risk(s):  …………………………… |  |
| Is the fire extinguisher full and mounted correctly? | Yes  No |  |
| Are the hazard signs properly mounted and visible? | Yes  No  If no, describe the issue:  …………………………… |  |
| Is the lightning air terminal adequately supported? | Yes  No  If no, describe the issue:  …………………………… |  |
| Is the down conductor of the lightning air terminal properly insulated and not in contact with other metallic components? | Yes  No  If no, describe the issue:  …………………………… |  |
| Are all components properly grounded?  Tick all earthing points after checking. | Solar PV array  DC combiner boxes  Inverters  AC breakers  AC combiner boxes  Any observed issues:  ………………………………… |  |
| Spare parts (if applicable)  There may be spare equipment such as inverters, MCCBs, MCBs, etc. kept at the site for quick maintenance. Ensure these spare parts are safe and secure. | Are the spare equipment(s) secured in a room without access to unauthorized personnel? | Yes  No  If no, describe the issue:  …………………………… |  |
| Are the equipment properly packaged and dry? | Yes  No  If no, describe the issue:  …………………………… |  |
| Is there any damage observed in the store items? | Yes  No  If no, describe the damage:  …………………………… |  |
| System check | | | |
| System operation  Check normal inverter operation (LED indicators, fan noise, inverter casing temperature, etc.) | Is the inverter(s) LED indicating normal operation? | Yes  No  If no, describe indicator status:  …………………………… |  |
| By hearing observation, is the inverter(s)’s fan noise normal? | Yes  No  If no, describe the anomaly:  …………………………… |  |
| Is the inverter(s) casing within the acceptable temperature? | Yes  No  If not, what is the temperature?  …………………………… |  |
| Remote monitoring  Normal operation of remote monitoring is essential to assess system operation and performance. | Is the system feeding data to the server and can be monitored remotely? | Yes  No  If no, describe the problem:  …………………………… |  |
| Cables  Cables: Cables should not be loose or disconnected. The cable insulations should not be damaged by sharp objects, bending, pressure applied by other objects, etc.  Conduits: Cable conduits should be properly sealed allowing no ingress during rain. | Are there any cable disconnections in DC breaker boxes, inverter inputs, AC breaker boxes and AC combiner boxes? | Yes  No  If yes, describe location(s) of cable disconnection(s):  …………………………… |  |
| Are all cable connections in the inverter(s) properly insulated and terminated? | Yes  No  If yes, describe location(s) of cable damage(s):  …………………………… |  |
| Is there any risk of cable insulation damage due to contact with sharp objects? | Yes  No  If yes, describe location(s) of cable damage risk:  …………………………… |  |
| *Outside power conditioning room:*  Are the cable conduits properly sealed (not allowing water seepage)? | Yes  No  If no, describe the issue:  …………………………… |  |
| *In PV array location:*  Are all solar panel inter-wiring cables neatly tied? | Yes  No  If no, describe the issue:  …………………………… |  |
| PV array  The PV array should be clean and the cleaning mechanism must be working properly. | Are all PV modules clean? | Yes  No |  |
| Is there adequate water access to clean the entire PV array? | Yes  No  If no, describe the issue:  …………………………… |  |
| Walking across the array, are there any physical damages to the panels (cracks, hot spots, etc.)? | Yes  No  If yes, describe the damage:  …………………………… |  |
| Walking across the array, are there any physical damages to the solar PV mounting structure (loose fixtures, etc.)? | Yes  No  If yes, describe the damage:  …………………………… |  |
| Is there any distortion observed in the solar PV structure or panels that may cause undesired mechanical stress on the solar panels? | Yes  No  If yes, describe the issue:  …………………………… |  |
| Is there any new object(s) that has caused shading in the panels? | Yes  No  If yes, describe shading:  …………………………… |  |
| During solar array inspection, were any of the following observed? | Faulty panel, describe:  …………………………………  Faulty cable, describe:  …………………………………  Faulty cable connections, describe:  ………………………………… |  |

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| Additional notes/remarks |
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Open the DC combiner boxes and record the voltage of each array string

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| Combiner box # | String # | Voltage |
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Open the individual inverter AC breaker box and record the voltage and current of each inverter.

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| Inverter # | Line-line voltage | Line-neutral voltage | Current R (A) | Current Y (A) | Current B (A) |
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Open the AC combiner box and record the voltage of the AC output.

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| Line-line voltage | Line-neutral voltage | Current R (A) | Current Y (A) | Current B (A) |
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| Performance checks | | Rectifications made |
| For the day of maintenance, record the key system performance data | | |
| Date | Same as O&M date  Date: ………………………..(dd/mm/yyyy) |  |
| Total daily production | ………….kWh |  |
| Peak production | ………….kW |  |
| Any abnormality observed in the system performance? | Yes, describe:….…………………..………  ………………………………………………….  No |  |

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| Warranty | | | |
| Components | **Warranty period** | **Is the warranty period valid?** | **Remaining duration** |
| Solar PV modules |  | Yes  Expired | …………….. years  NA |
| Grid-connected inverters |  | Yes  Expired | …………….. years  NA |
| DC breaker boxes |  | Yes  Expired | …………….. years  NA |
| AC breaker boxes |  | Yes  Expired | …………….. years  NA |
| AC combiner boxes |  | Yes  Expired | …………….. years  NA |

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| Conclusion | |
| Overall, have all rectifications been made during O&M, and is the system operating optimally? | Yes  No, describe: .…………………..………… |
| List components that need replacement: | None   1. …………………………………………………………………….............. 2. …………………………………………………………………….............. 3. …………………………………………………………………….............. 4. …………………………………………………………………….............. |
| Describe any pending rectifications necessary and explain why. | 1. …………………………………………………………………….............. 2. …………………………………………………………………….............. 3. ……………………………………………………………………............... 4. ……………………………………………………………………............... |

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| Client representative | Name: ……………………………………….. | Signature: ……………………………………. |
| O&M technician | Name: ……………………………………….. | Signature: ……………………………………. |