# Monitoring report form for CDM project activity
## (Version 07.0)

| MONITORING REPORT | | |
|---|---|---|
| **Title of the project activity** | Renewable Power Project by Emami Power Ltd | |
| **UNFCCC reference number of the project activity** | 10393[1] | |
| **Version number of the PDD applicable to this monitoring report** | 02 | |
| **Version number of this monitoring report** | 03 | |
| **Completion date of this monitoring report** | 01/06/2020 | |
| **Monitoring period number** | 01 | |
| **Duration of this monitoring period** | 03/08/2017 to 30/09/2019 (inclusive of both dates) | |
| **Monitoring report number for this monitoring period** | Not Applicable | |
| **Project participants** | Emami Power Limited | |
| **Host Party** | India | |
| **Applied methodologies and standardized baselines** | ACM0002- Grid-connected electricity generation from renewable sources --- Version 17.0<br><br>Standardized Baseline: Not Applicable | |
| **Sectoral scopes** | Sectoral Scope 1: Energy Industries (renewable - /non renewable sources) | |
| **Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period** | Amount achieved before 1 January 2013 | Amount achieved from 1 January 2013 |
| | 0 | 60,717 $tCO_2e$ |
| **Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD** | 68,500 $tCO_2e$ | |

[1] https://cdm.unfccc.int/Projects/DB/Applus1501710196.92/view

## SECTION A. Description of project activity

### A.1. General description of project activity

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Emami Power Ltd is the project participant of the proposed project activity. The project activity involves installation of 20 MW AC (22.5 MWp DC) solar power project Villages: Udelhedi, Naharpur, Mannakhedi,Kumrada, Tehsil: Roorkee District: Haridwar. The project replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 31,689 $tCO_2e$ per year, thereon displacing 32,412 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal /fossil fuel based power plant.

**Scenario existing prior to the implementation of project activity:**

The scenario existing prior to the implementation of the project activity, is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

**Baseline Scenario:**

As per the applicable methodology, a Greenfield power plant is defined as "*a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity*".

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per paragraph 24 of Section 5.2.1 of applied methodology is the following:

*If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".*

Hence, pre-project scenario and baseline scenario are the same.

The details of the project and the state of installation are mentioned in the table:-

| Project Participant Name | Capacity in MW | Connection with Grid | State | Usage of Electricity |
|---|---|---|---|---|
| Emami Power Ltd. | 20 MW (AC) | Indian Grid | Uttrakhand | Sale to Grid |

**Total emission reductions achieved in this monitoring period:**

During the reported monitoring period 03/08/2017 to 30/09/2019 (First and last date included) the project activity has supplied 62,113 MWh of electricity, and thus contributing to the GHG reductions of 60,717 $tCO_2e$.

### A.2. Location of project activity

Country: India
State : Uttarakhand
Village: Udelhedi, Naharpur, Mannakhedi, Kumrada
Tehsil : Roorkee

District: Haridwar

Latitude: N 29° 45' 11.18"
Longitude: E 77° 49' 18.76"




The project location as visible in Google Maps is shown below:




## A.3. Parties and project participants

| Parties involved | Project participants | Indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| India | Emami Power Limited | No |

### A.4. References to applied methodologies and standardized baselines

Grid-connected electricity generation from renewable sources[2]

Reference: The project activity meets the eligibility criteria of large scale project as it is more than 15MW
Methodology: ACM0002: Grid-connected electricity generation from renewable sources --- Version 17.0
Type I : Energy industries (renewable / non-renewable sources)
Category : Approved Consolidated Methodology (ACM0002)

### A.5. Crediting period type and duration

Renewable crediting period of 7 years 00 Months have been opted for the project activity. This is the first crediting period of the project activity.

| | |
|---|---|
| Type of crediting period | Renewable |
| Crediting period from | 03/08/2017-02/08/2024 |
| Length of the Crediting Period | 7 Years |
| Current Monitoring period number | 01 |
| Current Monitoring period from | 03/08/2017-30/09/2019 (inclusive of both dates) |
| Length of the Monitoring Period | 789 Days |

## SECTION B. Implementation of project activity

### B.1. Description of implemented project activity

The project activity aims to harness solar energy through installation of PV with total installed capacity of 20 MW.

The technical specifications of project activity

| Technical detail of the equipment | Remark |
|---|---|
| Technology | Multi Crystalline Silicon solar cell based modules |
| Make of Solar photovoltaic module | Hanwah Solar, China |
| Module Capacity | 315W and 320W |
| No. of modules | 320W : 52680 nos and 315W: 17920 nos; Total capacity of the plant - 22.5024MWp |
| Inverter Make | ABB, Bangalore |
| Capacity of Inverter | 1000kW |
| Total Number of Invertors | 20 Units |
| Transformer | 0.380-0.380/33KV, three windings; Rating : 2.1MVA Quantity: 20 numbers |
| Technical & Operational Lifetime | 25 ears |

[2] [2] http://cdm.unfccc.int/methodologies/PAmethodologies/approved

### B.2. Post-registration changes

#### B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

There is no request for deviation applied during this monitoring period.

#### B.2.2. Corrections

There have not been any corrections to project information or parameters fixed at validation during the current monitoring period.

#### B.2.3. Changes to the start date of the crediting period

Not Applicable

#### B.2.4. Inclusion of monitoring plan

Not Applicable

#### B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

Not Applicable for the current monitoring period.

#### B.2.6. Changes to project design

There has not been any change in the PDD during the current monitoring period.

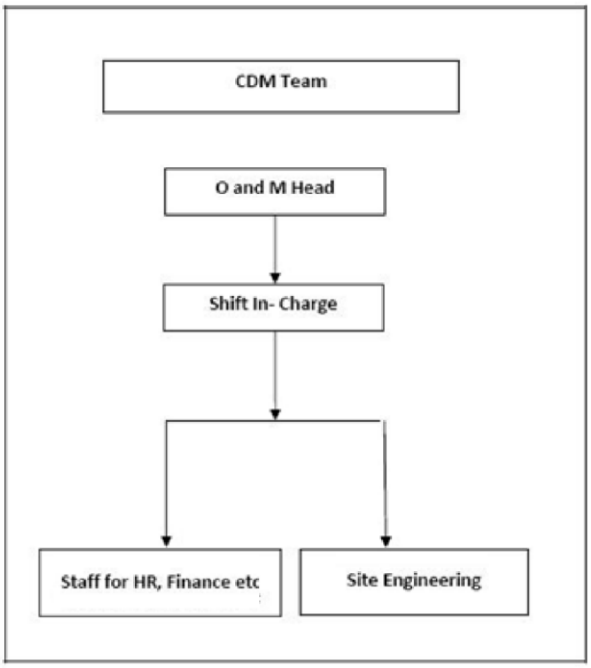
#### B.2.7. Changes specific to afforestation or reforestation project activity

Not Applicable

## SECTION C. Description of monitoring system

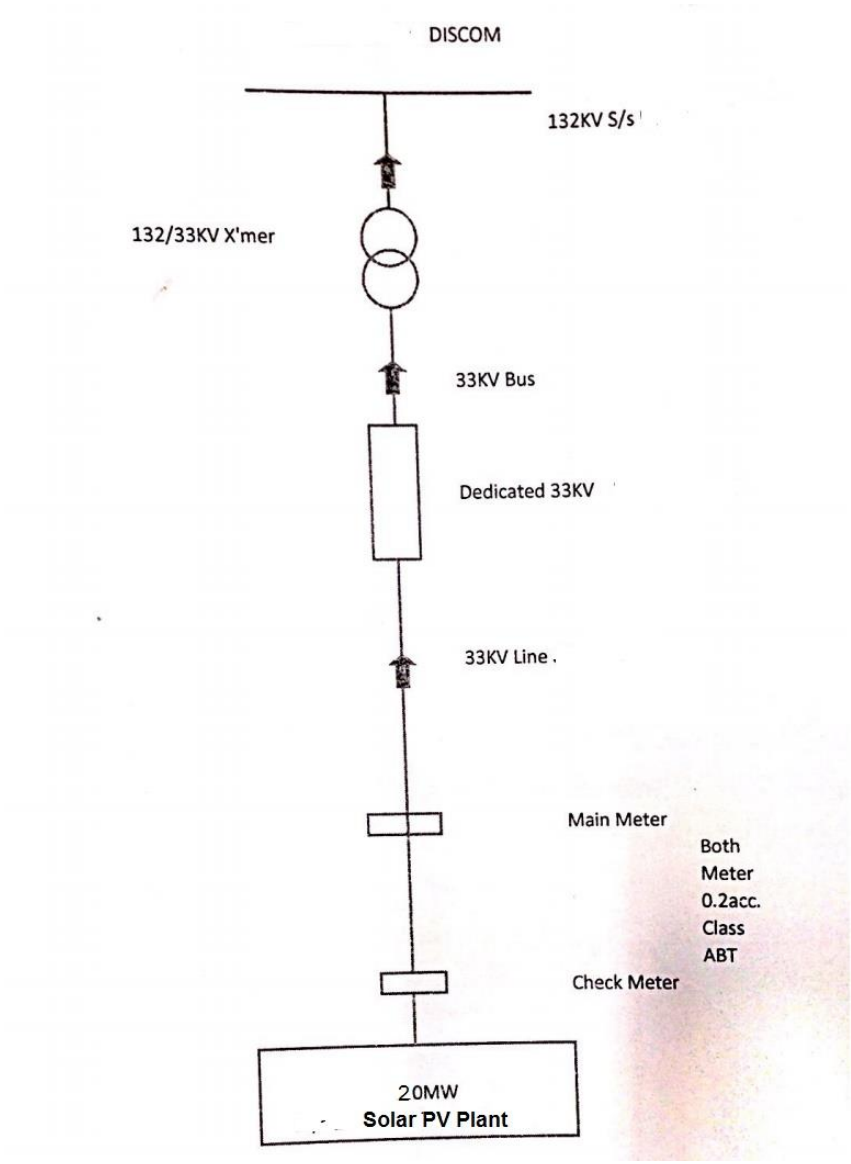
The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected solar power project being implemented at site. The monitoring plan, which is implemented by the project participant describes about the monitoring organization, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. The team comprises of the following members:




| Responsibility |
| --- |
| • Reviewing the monthly and annual generation statistics.<br>• Evaluating the GHG performance of the project activity.<br>• Identifying the opportunities for future improvement<br>• Addressing grievance related to project activity. |
| • Implementation of corrective appropriate measures in case any discrepancies are identified in the reported parameters.<br>• Review of monthly report.<br>• Ensuring calibration of monitoring equipment as and when required. |
| • Monitoring and reporting the GHG performance related parameters following the guidance provided in the project design document<br>• Preparation of monthly and annual generation statistics.<br>• Reporting of any discrepancies identified in the reporting parameters.<br>• Ensuring calibration of the monitoring equipments as and when required. |

The single line diagram depicting the metering locations has been represented in below figure:



**Data Measurement**

The export and import energy is measured continuously using meters. Readings of meters shall be taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement to Emami Power Limited, invoices are raised. These invoices can be used for cross checking the meter readings taken for the project activity.

**Data collection and archiving**

Readings from meters is collected in the presence of the plant in-charge. Export and Import data would be recorded and stored in logs as well as in electronic form on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data is 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later.

**Emergency preparedness**
The project activity does not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

**Personnel training**
In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff (CDM team) is trained. The plant helpers are trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

In case of mismatch between billing (JMR) period cycle and monitoring period cycle, the daily generation electricity data is used to calculate the electricity for specific period.

## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante

| **Data / Parameter** | $EF_{grid,OM,y}$ |
|---|---|
| Unit | $tCO_2/MWh$ |
| Description | Operating Margin $CO_2$ emission factor in year y |
| Source of data | Calculated from CEA database, Version 11, April 2016[3] |
| Value(s) applied | 0.9941 |
| Choice of data or Measurement methods and procedures | Calculated as per "Tool to calculate the emission factor for an electricity system, version 05" as 3-year generation weighted average using data for the years 2012-13, 2013-14, & 2014-15. The data are obtained from "$CO_2$ Baseline Database for Indian Power Sector" version 11, published by the Central Electricity Authority, Ministry of Power, Government of India. |
| Purpose of data/parameter | For the calculation of the Baseline Emission |
| Additional comment | This parameter is fixed ex-ante for the entire crediting period. |

| **Data / Parameter** | $EF_{grid,BM,y}$ |
|---|---|
| Unit | $tCO_2/MWh$ |
| Description | Build Margin $CO_2$ emission factor in year y |

[3] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

| | |
|---|---|
| Source of data | Calculated from CEA database, Version 11, April 2016[4] |
| Value(s) applied | 0.9285 |
| Choice of data or Measurement methods and procedures | Calculated as per "Tool to calculate the emission factor for an electricity system, version 05" as 3-year generation weighted average using data for the years 2012-13, 2013-14, & 2014-15. The data are obtained from "$CO_2$ Baseline Database for Indian Power Sector" version 11, published by the Central Electricity Authority, Ministry of Power, Government of India. |
| Purpose of data/parameter | For the calculation of the Baseline Emission |
| Additional comment | This parameter is fixed ex-ante for the entire crediting period. |

| **Data / Parameter** | $EF_{grid,CM,y}$ |
|---|---|
| Unit | $tCO_2/MWh$ |
| Description | Combined Margin $CO_2$ emission factor in year y |
| Source of data | Calculated from CEA database, Version 11, April 2016[5] |
| Value(s) applied | 0.9777 |
| Choice of data or Measurement methods and procedures | The combined margin emissions factor is calculated as follows:<br><br>$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$<br>Where:<br>$EF_{grid,BM,y}$= Build margin $CO_2$ emission factor in year *y* ($tCO_2/MWh$)<br>$EF_{grid,OM,y}$= Operating margin $CO_2$ emission factor in year *y* ($tCO_2/MWh$)<br>$W_{OM}$ = Weighting of operating margin emissions factor (%) = 75%<br>$W_{BM}$= Weighting of build margin emissions factor (%) = 25% |
| Purpose of data/parameter | For the calculation of the Baseline Emission |
| Additional comment | This parameter is fixed ex-ante for the entire crediting period. |

## D.2. Data and parameters monitored

| **Data/Parameter** | **$EG_{PJ,y}$** |
|---|---|
| Unit | MWh |
| Description | Quantity of net electricity generation supplied by the project plant/unit to the grid in year y in MWh |
| Measured/calculated/ default | Measured |
| Source of data | Monthly joint meter reading reports |
| Value(s) of monitored parameter | 62,113 |
| Monitoring equipment | Energy Meters of accuracy class 0.2 are used for monitoring. For detailed schedule of calibration of energy meters used during present monitoring period please refer Annexure- 1 |
| Measuring/reading/recording frequency | Continuous measurement & monthly recording |
| Calculation method (if applicable) | Net power exported to grid is calculated as a difference of export and import being recorded in monthly JMR reports.<br><br>**$EG_{PJ,y} = EG_{export} - EG_{import}$**<br>Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh.<br>The electricity exported / supplied by the project activity is measured through |

[4] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

[5] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

| | |
|---|---|
| | meters (ABT Meters) having accuracy class of 0.2s. It is difference of export and import of project activity.<br>Since the project activity is Green field project, the $EG_{PJ,y}$ is same as $EG_{facility,y}$. |
| QA/QC procedures | The meters is approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years.[18] The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines will be applied appropriately to confirm the conservativeness of metering.<br>The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP do not have any control on it. PP |
| Purpose of data/parameter | Calculation of baseline emissions |
| Additional comments | Data will be achieved electronically for a period of 2 years beyond the end of crediting period. |

### D.3. Implementation of sampling plan

Not Applicable

## SECTION E. Calculation of emission reductions or net anthropogenic removals

### E.1. Calculation of baseline emissions or baseline net removals

As per the approved consolidated Methodology ACM0002 (Version 17.0, EB 89, Annex 1) para 44:

Baseline emissions include only $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$

| | | |
|---|---|---|
| $EF_{CO2,grid,y}$ | = | $CO_2$ emission factor of the grid in year $_y$ |
| | = | 0.9777 $tCO_2e/MWh$ |
| EGpj,y | = | Net electricity delivered to the Indian grid |
| | = | 62,113 MWh |
| $BE_y$ | = | 62,113 * 0.9777 |
| | | 60,717 $tCO_2e$ |

### E.2. Calculation of project emissions or actual net removals

Since the project activity is a renewable energy project, which generates electricity using Solar PV modules, therefore there are no resulting project emissions.

### E.3. Calculation of leakage emissions

No leakage is considered from the project activity as per applied methodology ACM 0002.

### E.4. Calculation of emission reductions or net anthropogenic removals

| | Baseline GHG emissions or baseline net GHG removals (t $CO_2e$) | Project GHG emissions or actual net GHG removals (t $CO_2e$) | Leakage GHG emissions (t $CO_2e$) | GHG emission reductions or net anthropogenic GHG removals (t $CO_2e$) | | |
|---|---|---|---|---|---|---|
| | | | | Before 01/01/2013 | From 01/01/2013 | Total amount |
| **Total** | 60,717 | 0 | 0 | 0 | 60,717 | 60,717 |

## E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

| Amount achieved during this monitoring period (t $CO_2e$) | Amount estimated ex ante for this monitoring period in the PDD (t $CO_2e$) |
|---|---|
| 60,717 | 68,500 |

### E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

As per the CDM registered PDD, the amount of CERs generated annually is31,689 t$CO_2e$.
Therefore, the amount of estimated ex ante for this monitoring period is identified as explained below.
The total number of days in this monitoring period is 789 days.
Hence, the amount of estimated ex ante for this monitoring period = 31689 * (789 /365)
= 68,500 t$CO_2e$

## E.6. Remarks on increase in achieved emission reductions

From E.5 above, we can observe that actual emission reduction for the monitoring is lower than estimated emission reductions by 11%.This is due to low PLF during current monitoring period, which depends on solar radiation and is a natural phenomenon and not in control of PP.

## E.7. Remarks on scale of small-scale project activity

Not Applicable.

## Annexure 1: Meter Calibration Details

| Meter Serial Number and Type | Make | Accuracy Class | Date of Calibration | Validity |
|---|---|---|---|---|
| UKD02649 (Main meter) | Secure | 0.2s | 30/03/2017 | 29/03/2022 |
| UKD02652 (Check meter) | Secure | 0.2s | 30/03/2017 | 29/03/2022 |

| Meter Serial Number and Type[6] | Make | Accuracy Class | Date of Calibration | Validity |
|---|---|---|---|---|
| UKD03071 (Main meter) | Secure | 0.2s | 12/12/2018 | 11/12/2023 |
| UKD03072 (Check meter) | Secure | 0.2s | 12/12/2018 | 11/12/2023 |

[6] New Main and Check meters were tested and installed on 12/12/2018 and old meters were replaced as per State Electricity Board PPA norms.

## Document information

| *Version* | *Date* | *Description* |
|---|---|---|
| 07.0 | 31 May 2019 | Revision to:<br>• Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);<br>• Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period;<br>• Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes;<br>• Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods;<br>• Make editorial improvements. |
| 06.0 | 7 June 2017 | Revision to:<br>• Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);<br>• Make editorial improvements. |
| 05.1 | 4 May 2015 | Editorial revision to correct version numbering. |
| 05.0 | 1 April 2015 | Revisions to:<br>• Include provisions related to delayed submission of a monitoring plan;<br>• Provisions related to the Host Party;<br>• Remove reference to programme of activities;<br>• Overall editorial improvement. |
| 04.0 | 25 June 2014 | Revisions to:<br>• Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0));<br>• Include provisions related to standardized baselines;<br>• Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1;<br>• Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*;<br>• Editorial improvement. |
| 03.2 | 5 November 2013 | Editorial revision to correct table in page 1. |
| 03.1 | 2 January 2013 | Editorial revision to correct table in section E.5. |
| 03.0 | 3 December 2012 | Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11). |
| 02.0 | 13 March 2012 | Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20). |
| 01.0 | 28 May 2010 | EB 54, Annex 34. Initial adoption. |

| *Version* | *Date* | *Description* |
|---|---|---|

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: monitoring report