

ATTACHMENT J-8

MEASUREMENT AND VERIFICATION PLAN AND SAVINGS CALCULATION METHODS OUTLINE

J-8.1 EXECUTIVE SUMMARY/M&V OVERVIEW AND PROPOSED SAVINGS CALCULATIONS

Fill in the following tables or provide equivalent information.

J-8.1.1 Table 1 - Proposed Annual Savings Overview

[Include all applicable fuels/commodities for project, e.g., electric energy, electric demand, natural gas, fuel oil, coal, water, etc.]

ECM	Total energy savings (MBtu/yr)	Electric energy savings (kWh/yr)	Electric demand savings (kW/yr)*	Natural gas savings (MBtu/yr)**	Water savings (gallons/yr)	Other energy savings (MBtu/yr)**	Total energy and water cost savings, Year 1 (\$/yr)	Other energy-related O&M cost savings, Year 1 (\$/yr)	Total cost savings, Year 1 (\$/yr)
Total savings									
First Year Guaranteed Cost Savings: \$									
Notes MBtu=10 ⁶ Btu.*Annual electric demand savings (kW/yr) is the sum of the monthly demand savings. **If energy is reported in units other than MBtu, provide a conversion factor to MBtu for link to cost schedules (e.g., 0.003413 MBtu/kWh).									

J-8.1.2 Table 2 - Site Use and Savings Overview

	Total energy savings (MBtu/yr)	Electric energy savings (kWh/yr)	Electric demand savings (kW/yr)*	Natural gas savings (MBtu/yr)**	Water savings (gallons/yr)	Other energy savings (MBtu/yr)**
Total proposed project savings						

Usage for entire site***						
% Total site usage saved						
Project square footage (KSF)						
Total site square footage (KSF)						
% Total site area affected						
<u>Notes</u> MBtu=10 ⁶ Btu *Annual electric demand savings (kW/yr) is the sum of the monthly demand savings. **If energy is reported in units other than MBtu, provide a conversion factor to MBtu for link to cost schedules (e.g., 0.003413 MBtu/kWh). ***Define usage period. KSF = 10 ³ square feet.						

J-8.1.3 Table 3 - M&V Plan Summary

ECM No.	ECM Description	M&V Option Used*	Summary of M&V Plan

*M&V options A, B, C, and D and methods proposed for each ECM shall comply with the latest version of the “DOE/FEMP M&V Guidelines: Measurement and Verification for Federal Energy Projects,” Version 4.0 (or most current version); and the current version of the “International Performance Measurement and Verification Protocol (IPMVP).”

J-8.2 WHOLE PROJECT DATA/GLOBAL ASSUMPTIONS

J-8.2.1 Risk, Responsibility and Performance - Summarize allocation of responsibility for key items related to M&V

A. Reference location of Risk, Responsibility and Performance Matrix.

- B.** Note: The Risk, Responsibility and Performance Matrix is Attachment J-7

J-8.2.2 Energy, Water, and O&M Rate Data

- A.** Detail baseline energy and water rates.
- B.** Provide post-acceptance performance period rate adjustment factors for energy, water, and O&M cost savings, if used.

J-8.2.3 Schedule and Reporting for Verification Activities

- A.** Define requirements for witnessing of measurements during:
1. Baseline development
 2. Post-installation verification activities
 3. Post-acceptance performance period

B. **Table 4 - Schedule of Verification Reporting Activities**

Item	^a Recommended time of submission	^a Owner's review and acceptance period
Post-Installation Report	30 days after implementation period	60 days
Annual M&V Report	30 days after annual performance period	60 days

^aTimes are recommended based on industry practice; modify as needed.

C. **Define content and format of reports:**

1. Post-installation report. Use of Post-Installation Report Outline is recommended (sample available on FEMP's web site at http://www1.eere.energy.gov/femp/financing/superespcs_mvresources.html).
2. Annual M&V reports. Use of Annual Report Outline is recommended (sample available on FEMP's web site at http://www1.eere.energy.gov/femp/financing/superespcs_mvresources.html).
3. Interval M&V reports.

J-8.2.4 O&M Reporting Requirements

Define Government and ESCO reporting requirements:

- A. Summarize key verification activities and reporting responsibilities of Government and contractor on operations and maintenance items from details in ECM specific M&V Plans.
- B. Define content of reports and reporting schedule.

J-8.2.5 Construction Period Savings

Provide overview of how construction period savings will be calculated, if applicable.

J-8.2.6 Status of Rebates - Include if applicable.

- A. Provide a summary of the source of any third-party rebates or incentives provided on this project.
- B. Provide status of any third-party rebates or incentives.

J-8.2.7 Dispute Resolution - Describe plan for resolving disputes regarding issues such as baseline, baseline adjustment, energy savings calculation, and the use of periodic measurements.

J-8.3. ECM-Specific M&V Plan and Savings Calculation Methods

Develop section for each ECM.

J-8.3.1 Overview of ECM, M&V plan, and Savings Calculation for ECM

- A. Summarize the scope of work, location, and how cost savings are generated. Describe source of all savings including energy, water, O&M, and other (if applicable).
- B. Specify the M&V guideline and option used from the current M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 3.0; and the current version of the International Performance Measurement and Verification Protocol (IPMVP).
- C. Provide an overview of M&V Activities for ECM. Explain intent of M&V plan, including what is being verified.
- D. Provide an overview of savings calculations methods for ECM. Provide a general description of analysis methods used for savings calculations.

J-8.3.2 Energy and Water Baseline Development - Describe in general terms how the baseline for this ECM is defined.

- A. Describe variables affecting baseline energy or water use.

1. Include variables such as weather, operating hours, set point changes, etc.
 2. Describe how each variable will be quantified, i.e., measurements, monitoring, assumptions, manufacturer data, maintenance logs, engineering resources, etc.
- B.** Define key system performance factors characterizing the baseline conditions. Include factors such as comfort conditions, lighting intensities, temperature set points, etc.
- C.** Define requirements for Government witnessing of measurements if different than whole project data requirements included in Section J-8.2.3.
- D.** Provide details of baseline data collected, including:
1. Parameters monitored
 2. Details of equipment monitored, i.e., location, type, model, quantity, etc.
 3. Sampling plan, including details of usage groups and sample sizes
 4. Duration, frequency, interval, and seasonal or other requirements of measurements
 5. Personnel, dates, and times of measurements
 6. Proof of Government witnessing of measurements (if required)
 7. Monitoring equipment used
 8. Installation requirements for monitoring equipments (test plug for temperature sensors, straight pipe for flow measurement etc.)
 9. Certification of calibration/calibration procedures followed
 10. Expected accuracy of measurements/monitoring equipment
 11. Quality control procedures used
 12. Form of data (.xls, .cvs, etc.)
 13. Results of measurements (attach appendix and electronic forma as necessary)
 14. Completed data collection forms, if used
- E.** Provide details of baseline data analysis performed, including:
1. Analysis using results of measurements
 2. Weather normalized regressions
 3. Weather data used and source of data

J-8.3.3 Proposed Energy and Water Savings Calculations and Methodology

- A.** Provide detail description of analysis methodology used. Describe any data manipulation or analysis that was conducted prior to applying savings calculations.

- B.** Detail all assumptions and sources of data, including all stipulated values used in calculations.
- C.** Include equations and technical details of all calculations made. (Use appendix and electronic format as necessary.) Include description of data format (headings, units, etc.).
- D.** Details of any savings or baseline changes that may be required.
- E.** Detail energy and water rates used to calculate cost savings. Provide post-acceptance performance period energy and water rate adjustment factors, if different from those identified Section J-8.2.2.B.
- F.** Detail proposed savings for this energy conservation measure for post-acceptance performance period. Include J-8.3.6, Table 5 - Proposed Annual Savings for Each ECM.

J-8.3.4 Operations and Maintenance Cost Savings

- A.** Provide justification for O&M cost savings.
 - 1. Describe how savings are generated
 - 2. Detail cost savings calculations.
- B.** Provide post-acceptance performance period other cost savings adjustment factors, if different from those identified in Section J-8.2.2.B.

J-8.3.5 Details of other savings (if applicable)

- A.** Provide justification for cost savings.
 - 1. Describe how savings are generated.
 - 2. Detail cost savings calculations.
- B.** Provide post-acceptance performance period other cost savings adjustment factors, if different from those identified in Section J-8.2.2.B.

J-8.3.6 Table 5 - Proposed Annual Savings for Each ECM

[Include all applicable fuels/commodities for project, such as: electric energy, electric demand, natural gas, fuel oil, coal, water, etc.]

Total energy use (MBtu/yr)	Electric energy use (kWh/yr)	Electric energy cost, Year 1 (\$/yr)	Electric demand* (kW/yr)	Electric demand cost, Year 1 (\$/yr)	Natural gas use (MBtu/yr)**	Natural gas cost, Year 1 (\$/yr)	Water use (gallons/yr)	Water cost, Year 1 (\$/yr)	Other energy use (MBtu/yr)**	Other energy cost, Year 1 (\$/yr)	Other energy-related O&M costs, Year 1 (\$/yr)	Total costs, Year 1 (\$/yr)
Baseline use												
Post-installation use												
Savings												
Notes MBtu = 10 ⁶ Btu. *Annual electric demand savings (kW/yr) is the sum of the monthly demand savings. **If energy is reported in units other than MBtu, provide a conversion factor to MBtu for link to cost schedules (e.g., 0.003413 MBtu/kWh).												

J-8.3.7 Post-Installation M&V Activities - Describe the intent of post-installation verification activities, including what will be verified.

- A.** Describe variables affecting post-installation energy or water use.
 1. Include variables such as weather, operating hours, set point changes, etc.
 2. Describe how each variable will be quantified, i.e., measurements, monitoring, assumptions, manufacturer data, maintenance logs, engineering resources, etc.
- B.** Define key system performance factors characterizing the post-installation conditions such as lighting intensities, temperature set points, etc.
- C.** Define requirements for Government witnessing of measurements if different than whole project data requirements identified in Section J-8.2.3.
- D.** Provide details of post-installation data to be collected, including:
 1. Parameters to be monitored
 2. Details of equipment to be monitored (location, type, model, quantity, etc.)

3. Sampling plan, including details of usage groups and sample sizes
4. Duration, frequency, interval, and seasonal or other requirements of measurements
5. Monitoring equipment to be used
6. Installation requirements for monitoring equipment
7. Calibration requirements/procedures
8. Expected accuracy of measurements/monitoring equipment
9. Quality control procedures to be used
10. Form of data to be collected (.xls, .csv, etc.)
11. Sample data collection forms (optional)

E. Detail data analysis to be performed.

J-8.3.8 Post-Acceptance Performance Period Verification Activities

- A.** Describe variables affecting post-acceptance performance period energy or water use.
1. Include variables such as weather, operating hours, set point changes, etc.
 2. Describe how each variable will be quantified, i.e., measurements, monitoring, assumptions, manufacturer data, maintenance logs, engineering resources, etc.
- B.** Define key system performance factors characterizing the post-acceptance performance period conditions. Include factors such as comfort conditions, lighting intensities, temperature set points, etc.
- C.** Describe the intent of post-acceptance performance period verification activities – what will be verified.
- D.** Provide detailed schedule of post-acceptance performance period verification activities and inspections.
- E.** Define requirements for Government witnessing of measurements if different than whole project data requirements included in Section J-8.2.3.
- F.** Provide details of post-acceptance performance period data to be collected, including:
1. Parameters to be monitored
 2. Details of equipment to be monitored (location, type, model, quantity, etc.)
 3. Sampling plan, including details of usage groups and sample sizes
 4. Duration, frequency, interval, and seasonal or other requirements of measurements
 5. Monitoring equipment to be used

6. Installation requirements for monitoring equipment
7. Calibration requirements/procedures
8. Expected accuracy of measurements/monitoring equipment
9. Quality control procedures to be used
10. Form of data to be collected (.xls, .cvs, etc.)
11. Sample data collection forms (optional)

G. Detail data analysis to be performed.

H. Define O&M and repair reporting requirements.

1. Detail verification activities and reporting responsibilities of agency and contractor on operations and maintenance items.
2. Define reporting schedule, if different than in global Section J-8.2.4.