

QUESTIONNAIRE REPORT SHEET

iPQ3CMVP.V2.1



B E Y O N D

S M A R T C I T I E S

AEE'S CERTIFIED MEASUREMENT & VERIFICATION PROFESSIONAL
CMVP EXAM QUESTION BANK

iPQ.No	Correct Answer	Points	Explanation
3CMVP001	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> Enhancing Engineering Design and Optimization of Facility Operations and Maintenance This study aims to validate the outcomes of emission reduction efforts and provide support for the evaluation of efficiency programs.
3CMVP002	3	8	<p>Answer = 3</p> <p>Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> ISO 50001 provides a framework for organisations that wish to implement energy management best practises. ISO 50006 and 50015 address the requirements for establishing baselines and measuring progress towards the successful implementation of 50001.
3CMVP003	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> In order to enhance energy utilization efficiency, it is imperative to establish a comprehensive policy framework. Revise the targets and objectives in order to align with the established policy. This analysis aims to evaluate the efficacy of the policy and propose ongoing enhancements for energy management.
3CMVP004	3	8	<p>Answer = 3</p> <p>Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> Gives practical advice on meeting ISO 50001 requirements and energy management. Provides measurement and verification guidelines, enhancing the overall energy performance credibility.
3CMVP005	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> Propose the formulation of a policy aimed at enhancing the efficacy of energy utilization. Revise the targets and objectives in order to align with the established policy. Utilize empirical evidence to enhance comprehension and facilitate informed decision-making pertaining to energy consumption. Assess the outcomes Evaluate the effectiveness of the policy and consistently enhance energy management practices.

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3CMVP006	1	8	<p>Answer = 1 True</p> <p>Explanation: The core principles encompassed within the ISO series of standards exhibit substantial congruence with the International Performance Measurement and Verification Protocol (IPMVP). However, the standard 50001 places emphasis on the comprehensive performance of the energy system, encompassing both energy inputs and organizational outputs. As a result, it employs distinct terminology to refer to similar concepts.</p>
3CMVP007	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • An effective Measurement and Verification (M&V) plan encompasses the comprehensive provision of data and computational procedures necessary for accurately determining savings while adhering to budgetary constraints. • A crucial aim of the Measurement and Verification (M&V) plan is to achieve a harmonious equilibrium between cost considerations and the level of precision.
3CMVP008	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • For Option A, documentation of any stipulated parameters showing their overall importance to the total expected saving and describing their uncertainty. • Option D: Simulation software name and version number, input files, output files, weather reference files, measurements, assumptions and calibration, accuracy
3CMVP009	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The utilization of surveys and inspections • Activities related to the measurement and monitoring of a specific parameter or variable within a limited timeframe.
3CMVP010	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Determine Goals for M&V Efforts and Select IPMVP Option(s) and Approaches • Document Baseline Data and Develop M&V Plan • Set-up Metering and Ongoing Data Collection Processes
3CMVP011	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • It is imperative to consistently monitor and assess any alterations in the conditions of the site. • Please provide confirmation of operational verification.

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3CMVP012	1	8	<p>Answer = 1 True Explanation:</p> <p>A crucial component within the Measurement and Verification (M&V) process involves establishing the baseline, which outlines the initial conditions prior to implementation, against which the subsequent savings or specified performance parameters are evaluated.</p>
3CMVP013	4	8	<p>Answer = 4 All of the above Explanation:</p> <ul style="list-style-type: none"> • Modifications in facility utilization or operational circumstances and alterations in occupancy. • The alterations in the schedules for operating equipment. • Alterations in outdoor environmental conditions
3CMVP014	4	8	<p>Answer = 4 All of the above Explanation:</p> <ul style="list-style-type: none"> • Ongoing Data Collection and Determine Savings for Period • M&V Report for Period • Track Energy Performance and Savings
3CMVP015	4	8	<p>Answer = 4 All of the above Explanation:</p> <ul style="list-style-type: none"> • This process involves restating the energy consumption or demand during a specific reporting period and baseline period, while ensuring that both periods are evaluated under a consistent set of conditions. • Mathematical or physics-based models are employed to make adjustments to energy consumption and demand. • Distinguishing characteristics differentiate savings reports from cost or consumption comparisons prior to and following the implementation of Energy Efficiency Measures (EEMs).
3CMVP016	1	8	<p>Answer = 1 True Explanation:</p> <p>In general, it is recommended that the average annual costs associated with Measurement and Verification (M&V) should not exceed 10% of the average annual cost savings being evaluated. However, there may be instances where higher levels of expenditure are deemed suitable.</p>
3CMVP017	3	17.4	<p>Answer = 3 Option A or B Explanation:</p> <p>The retrofit isolation type of measurement boundary selected generally aligns with Option A or B.</p>
3CMVP018	4	17.4	<p>Answer = 4 Option C or D Explanation:</p> <p>In the majority of cases, the selected measurement boundary for the facility aligns with either Option C or Option D.</p>

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3CMVP019	4	8	<p>Answer = 4</p> <p>The weather has no effect on the building's total energy demand and consumption.</p> <p>Explanation:</p> <p>The following statements regarding baseline energy data are accurate.</p> <ul style="list-style-type: none"> • Weather affects whole-building energy demand and consumption. • The energy consumption and demand of a compressed air system may only be governed by plant production levels, which vary on a weekly cycle. • Collecting and documenting static factors like scheduled operating hours can help adjust M&V reporting.
3CMVP020	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Measures the energy impacts at the equipment or system level • Usually requires one or more dedicated meters • Savings are determined for each EEM, and any impacts beyond the measurement boundary are estimated
3CMVP021	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Only the performance of the systems affected by the EEM is of concern, and savings from each EEM need to be reported. • The expected savings from the EEM(s) are too small to be detected using Option C or to justify the expense of using Option D. • Sub-meters already exist to isolate energy consumption and demand in affected systems, and adding sub-meters is a possibility.
3CMVP022	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Only the performance of the systems affected by the EEM is of concern, and savings from each EEM need to be reported. • The expected savings from the EEM(s) are too small to be detected using Option C or to justify the expense of using Option D. • Sub-meters already exist to isolate energy consumption and demand in affected systems, and adding sub-meters is a possibility.
3CMVP023	1	8	<p>Answer = 1</p> <p>True</p> <p>Explanation:</p> <p>In the context of M&V plans employing Option A, modifications in facility operations that fall beyond the purview of the ESCO are commonly disregarded, instead relying on predetermined values derived from well-informed assumptions.</p>

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3CMVP024	2	17.4	<p>Answer = 2 Option B is preferred if feasible. Explanation:</p> <p>Option B is preferred if feasible. Keeping M&V costs low and appropriate relative to the level of savings expected can be a challenge, and sampling techniques may sometimes reduce Option B costs. Option C may not be suitable based on the general guidance that savings should generally exceed 5% to 10% of a facility's metered use to be quantifiable.</p>
3CMVP025	3	17.4	<p>Answer = 3 Options B and C are generally the most suitable. Explanation:</p> <p>Options B and C are generally most suitable. A high-savings EEM may be measurable with Option C but requires a means to monitor static factors to detect the need for non-routine adjustments. Using Option B, in some cases, may reduce the number of static factors to track without reducing accuracy. Additional costs may be justified to enable accurate reporting. For example, if the savings from an EEM are \$1,000,000 annually, an annual M&V cost of \$20,000 (2% of savings) may be reasonable.</p>
3CMVP026	1	8	<p>Answer = 1 True Explanation:</p> <p>A measurement boundary refers to a conceptual demarcation established around the equipment and/or systems that are pertinent for evaluating the cost reductions attained through an Energy Conservation Measure (ECM).</p>
3CMVP027	1	17.4	<p>Answer = 1 Option A or B Explanation: Option A or B</p>
3CMVP028	2	17.4	<p>Answer = 2 Option B Explanation: Option B</p>
3CMVP029	1	17.4	<p>Answer = 1 \$0.08000 per kWh. Explanation:</p> <p>A utility rate is an example of an exact number. If a local power company charges \$0.08 per kWh and Company X uses 725,691.0 kWh in one month, the utility bill would be \$43,541.46, not \$40,000, according to the rounding rule. This is due to the fact that the utility rate is precise; it can be represented as \$0.08000 per kWh.</p>

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3CMVP030	4	8	<p>Answer = 4 Commissioning plays a critical role in performance contracts.</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The costs and benefits of M&V accuracy are divided between the ESCO and the owner in performance contracts. • Maximizes the savings and the persistence of savings over documents the contract term • M&V plays a critical role in performance contracts.
3CMVP031	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The calculation of savings and adjustments is exclusive to Certified Management Value Professionals (CMVPs) only. The savings calculations will be conducted in accordance with established engineering principles and will be executed to the highest standards of professional competence. • Each calculation will be verified by an individual who possesses project management expertise and a high level of skill. • The energy consumption data, encompassing electricity, natural gas, oil, and other relevant sources, extracted from the invoices provided by energy suppliers, will be utilized for the purpose of quantifying the potential savings in utility costs.
3CMVP032	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Use more precise measurement equipment • Look for more independent variables that have an influence on energy consumption • Increase the measurement sample size
3CMVP033	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Consistency with the principles of M&V • All required M&V plan elements • Approval is obtained from all parties interested in adhering to the IPMVP.
3CMVP034	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • In order to effectively incorporate Measurement and Verification (M&V) processes, it is imperative to integrate them within the broader project implementation timeline, rather than treating M&V as a secondary consideration. • In order to accurately quantify the benefits of the project, it is imperative to establish and assess the baseline period and conditions, as well as to gather sufficient baseline data. This ensures a precise measurement rather than a mere estimation of the project's impact.

iPQ.No	Correct Answer	Points	Explanation
3CMVP035	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Calculate baseline and post-retrofit energy use • Determine the size of adjustments • Calculate energy savings.
3CMVP036	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Static factors—the factors related to infrequent events that may cause a material change in energy consumption. • Static factors—the factors related to infrequent events that may cause a material change in energy consumption. • Independent variables—the variables that cause routine changes in energy use, which
3CMVP037	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The primary emphasis is solely on the extracellular matrix (ECM). • The estimation or disregard of interactive effects can be readily accomplished. • The facility exhibits a high degree of complexity and presents challenges in terms of analysis.
3CMVP038	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • ECMs involve activities where energy use is difficult to separately measure, e.g(glazing or shading, operator training) • Savings are large when compared with the overall site energy use. • Various ECMs are being implemented over a long period of time.
3CMVP039	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Investments in energy efficiency aim to reduce risk. M&V faster final savings verification would please investors. • By understanding how specific interventions affect facility energy use in near real time and receiving early warnings of installation problems, facility owners and operators can more reliably achieve anticipated savings. • M&V service providers can benefit if M&V tools improve capabilities and value, increasing demand.
3CMVP040	3	8	<p>Answer = 3</p> <p>Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Availability of hourly data allows more granular analytic approaches that can estimate impacts by time of day. • Automated Analysis Emerging, often cloud-based, software can use improved data access and advanced analytics to automate and accelerate the M&V process.

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3CMVP041	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Huge capacity gap exists GLOBALLY of not being able to measure and verify EE savings • The M&V Gap is primarily caused by a lack of experts who have the capability to develop or evaluate M&V plans or energy savings calculations • Need M&V experts with in experience/capability to estimate and measure & verify EE Project savings
3CMVP042	4	8	<p>Answer = 4</p> <p>Proposed as a guideline 15% of project cost, but could vary based on project scope, complexity, and additional benefits</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Can be claimed back as an expense • To be considered in context of wider benefits • Proposed as guidance $\pm 5\%$ of project cost, but could be anything dependent on the project scope, complexity and additional benefits

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3CMVP043	3	17.4	<p>Answer = 3 Option A or B Explanation:</p> <p>The following are insights into Option A or B and related items to consider, recognizing that we do not know the answers to the questions above.</p> <p>VFDs reduce motor electricity consumption. If the retrofit involves converting to or optimizing VAV air system delivery, the main benefits may be reduced heating and cooling loads (less air).</p> <ul style="list-style-type: none"> • The fresh air ratio is a key parameter because we don't know it (to be monitored). • Airflow—mixed fresh and recirculated air—is important. • Air handling units (AHUs) may not affect heating-cooling plant efficiency if they don't contribute much to the building's load. This allows efficiency estimation. Unless it's a key parameter, since the question mentioned many AHUs, we assume so. <p>Before using the ECM, calibrate the energy model. Option A could be considered:</p> <p>Option A: Before and after implementation, measurements can be taken under specific conditions (external temperature and humidity, airflow, % fresh air, etc.). The energy model could extrapolate for 12 months. If real savings don't need long-term proof, this is possible.</p> <p>Note: estimating heating-cooling plan efficiency</p> <p>ECM configuration can significantly impact heating-cooling plant efficiency. Option A, applied with estimated efficiency, will affect savings precision unless efficiency can be monitored or simulated.</p> <p>Option B: This VFD retrofit could benefit from Option B and maximize savings over time. Be sure to take enough baseline measurements—the air distribution system may affect baseline motor power. Baseline fan power should match control system data. Functionally test the system during baseline measurements to cover all operating conditions. It may be interesting to recommend option B based on reporting period length. The reporting period for AHUs should be a full heating or cooling cycle, depending on the project's location. Up to 12 months. Option B may be difficult or expensive for many AHUs over the course of a year.</p>
3CMVP044	3	17.4	<p>Answer = 3 Options A, B, or D Explanation: Options A, B, or D</p>

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3CMVP045	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • This reduction in heat will affect the energy use of the air conditioning system, reducing cooling loads but potentially increasing heating requirements. • Because of how the measurement boundary was chosen, the energy savings from the air conditioner are seen as an interactive effect. • Should these savings be significant, there is the option of creating a second M&V project for the air conditioning system or expanding the original measurement boundary to incorporate both.
3CMVP046	2	17.4	<p>Answer = 2 Rs 628</p> <p>Explanation: Rs 628</p>
3CMVP047	2	17.4	<p>Answer = 2 Rs. 386</p> <p>Explanation: Rs. 386</p>
3CMVP048	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Direct project cost • Additional operations and maintenance cost • Training of personnel
3CMVP049	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • For new equipment, process improvements etc. • To provide staff training • To implement or upgrade the energy information system and And other priorities
3CMVP050	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Energy consumption per unit of production of a plant or process • Current state of repair and energy efficiency • Effect of any proposed measure on staff attitudes and behaviour

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3CMVP051	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Estimating the baseline energy consumption and demand under the conditions of the reporting period. • The objective of this study is to estimate the energy consumption and demand during the reporting period by extrapolating it to baseline operating conditions. • The task involves estimating the energy consumption and demand during both the baseline and reporting periods, while considering standard conditions.
3CMVP052	4	8	<p>Answer =4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Energy data and Periodic inspection findings • Independent variables • Static factors within the measurement boundary
3CMVP053	1	8	<p>Answer = 1 Energy Performance Contract</p> <p>Explanation: Energy Performance Contracting (EPC) is a financial mechanism that enables the financing of capital improvements by utilizing the cost savings generated from energy upgrades.</p>
3CMVP054	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Engineering calculations using short term or continuous post-retrofit measurements and stipulations. • Engineering calculations using short term or continuous measurements
3CMVP055	1	8	<p>Answer = 1 Energy use simulation, calibrated with hourly or monthly utility billing data and/or end-use metering.</p> <p>Explanation: The energy consumption simulation has been calibrated through the utilization of end-use metering and/or hourly or monthly utility billing data.</p>
3CMVP056	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Calibration methods for a variety of applications are included in ASHRAE Guidelines 14-2002 and 14-2014. • For the calibration to be valid, the equipment used to calibrate the sensors and meters must be of greater accuracy than the sensors or meters themselves.

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3CMVP057	4	8	<p>Answer = 4</p> <p>Only if the equipment has not been calibrated are manufacturer-provided accuracy specifications meaningful.</p> <p>Explanation:</p> <ul style="list-style-type: none"> • If savings estimates are based on information from high-quality sensors, they can be more accurate. • If the equipment has been calibrated, only then are the manufacturer-provided accuracies meaningful. • • The sensors and meters used to collect M&V data must be calibrated against recognized standards (such as those established by the National Institute of Standards and Technology).
3CMVP058	3	8	<p>Answer = 3</p> <p>Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Reasonable estimations can be made regarding the interactive effects of the EEM(s) on the energy consumption of other equipment, or it can be assumed that these effects are negligible. • Identifying or assessing potential modifications to the facility, outside the scope of the measurement boundary, would pose challenges.
3CMVP059	4	8	<p>Answer = 4</p> <p>All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Sub-meters are currently in existence or can be readily installed to effectively separate and measure the energy consumption of various systems. • Monitoring the independent variables that influence energy consumption is neither excessively challenging nor costly. • Identifying or assessing potential modifications to the facility, outside the scope of the measurement boundary, would pose significant challenges.
3CMVP060	2	17.4	<p>Answer = 2</p> <p>The customer is prepared to assume the savings risk and/or has previous exposure to similar EEM (s)</p> <p>Explanation: .</p> <ul style="list-style-type: none"> • The customer is willing to bear the risk associated with potential savings and/or has prior experience with similar energy efficiency measures (EEMs).
3CMVP061	3	8	<p>Answer = 3</p> <p>Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Periodic inspections are carried out in order to verify the ongoing functionality of instruments and equipment. • Strategies for addressing lost or missing data

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3CMVP062	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The meter specifications encompass various aspects such as the type, manufacturer, and model of the meter, along with details regarding its range, resolution, accuracy, and reading precision. • The collection of data, including the formats in which it will be gathered, and the associated responsibilities. • The protocol for meter reading and witnessing, if deemed necessary, is to be followed.
3CMVP063	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The quantity of space that is being heated or air-conditioned. • The nature of the products being manufactured or the quantity of production shifts conducted on a daily basis. • The building envelope encompasses various characteristics, including but not limited to new insulation, windows, doors, and air tightness.
3CMVP064	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <p>The factors that can influence the indoor environmental quality of a facility include the quantity, nature, and utilization of the equipment used by both the facility and its users. Additionally, the indoor environmental standards, such as light levels, temperature, and ventilation rate, play a crucial role in determining the quality of the indoor environment. Lastly, the type of occupancy or the schedule of activities within the facility can also impact the indoor environmental conditions.</p>
3CMVP065	4	8	<p>Answer = 4 Inspection of the ECM prior to installation.</p> <p>Explanation:</p> <ul style="list-style-type: none"> • ECM design, • Careful estimating of the parameter • Careful ECM inspection after installation.
3CMVP066	4	8	<p>Answer =4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The level of detail and effort required to establish baseline conditions necessary for the selected option. • The quantity and intricacy of the measurement apparatus encompass various aspects, including the design, installation, maintenance, calibration, reading, and removal processes. • The sample sizes employed for the purpose of metering representative equipment.

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3CMVP067	1	17.4	<p>Answer = 1 Increase M&V expenditures up to \$10,000/year (10% of the savings), not 20%</p> <p>Explanation: Increase M&V expenditures up to \$10,000/year (10% of the savings), not 20%</p>
3CMVP068	4	17.4	<p>Answer = 4 All of the above</p> <p>Explanation: Addressing Uncertainty in M&V Plans and Reports: M&V plans need to discuss the expected uncertainty associated with:</p> <p>Metering equipment. Discuss the metering equipment chosen. Have the meters been tested? What are the manufacturer's claims for accuracy?</p> <p>Modeling approach. Clearly explain the models to be used. What are the dependent and independent variables? Are there any important variables left out? Why? What is the plan for conducting sensitivity analysis?</p> <p>Sampling design. Clearly lay out the sample design. How many end-uses will be metered and for how long? What is the potential impact of a metered period relative to a full year? What is the expected level of confidence and precision?</p>
3CMVP069	1	17.4	<p>Answer = 1 14% relative precision</p> <p>Explanation: 5,300 kWh — (1.645 · 450 kWh) and 5,300 kWh + (1.645 · 450 kWh)</p> <p>And the precision formulas are:</p> <p>Absolute Precision ($\hat{x}$) = 1.645 · 450 kWh = ±740 kWh Relative Precision ($\hat{x}$) = 740 kWh = ±14%</p>
3CMVP070	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • One method to mitigate sampling error is to increase the sample size of the population. • Typically, the cost tends to increase with an increase in the sample size.

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3CMVP071	1	17.4	<p>Answer = 1 68%</p> <p>Explanation:</p> <p>For the given data CV% is the coefficient of variation, the standard deviation divided by the mean = 0.5 e% is the desired level of relative precision 0.5 Z. is t statistics for the desired confidence level = 1.645 Calculate the initial sample size for 90% confidence, 10% precision, and a CV of 0.5. The initial sample size is</p> <p>For example, for 90% confidence, 10% precision, and a CV of 0.5, the initial sample size is:</p> $n_0 = \left(\frac{1.645 \cdot 0.5}{0.10} \right)^2 = 67.7$
3CMVP072	4	8	<p>Answer = 4 Traditional contract</p> <p>Explanation: Traditional contract</p>
3CMVP073	3	8	<p>Answer = 3 Performance monitoring</p> <p>Explanation: Performance monitoring</p>
3CMVP074	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Specific EEM(s) proposed, • Data availability, • Budget and professional judgment.
3CMVP075	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • When future changes occur within the measurement boundary, it is possible that estimation of non-key parameters will prevent the need for potentially challenging non-routine adjustments. • It is reasonable to expect that the estimates will produce some degree of uncertainty. • A straightforward and routine re-testing of the EEM's (or EEMs\') key parameters can be used to evaluate the EEM's (or EEMs\') continued effectiveness.
3CMVP076	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Use observations of building occupant behavior and facility operating and maintenance logs. • DO NOT use rules of thumb, proprietary software or algorithms, or guesses at operating parameters or data from other facilities.

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3CMVP077	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Project costs and expected savings • Complexity of the ECMs • Number of interrelated ECMs at a single facility
3CMVP078	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • System level calibration with hourly monitored data • Whole facility level calibration with monthly utility data • Whole facility level calibration with hourly utility data
3CMVP079	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Capable of modeling the project site and ECMs accurately. • Capable of being calibrated to an acceptable level of precision. • Able to use actual weather data in hourly format.
3CMVP080	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • When projects are too complex and have too many ECMs to use retrofit isolation methods A or B cost-effectively • When interactive effects between ECMs are too complex for retrofit isolation strategies but must be quantified • When complex adjustments to the baseline are anticipated during the performance period
3CMVP081	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • No matter the model, all independent variables that affect energy consumption must be specified. Weather, building occupancy, set points, time of day, number of meals, etc. are critical variables. Outdoor air temperature is the main variable for many ECMs. • Independent variables must match billing meter reading dates and intervals. Specify data collection sources and frequencies. • To avoid overstating seasonal variations, model data should be from whole-year sets (12, 24, 36, or 48 months).
3CMVP082	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Savings are predicted to be greater than about 10% to 20% of the overall consumption measured by the utility or submeter on a monthly basis. • At least 12 (preferably 24) months or more of pre-installation data are available to calculate a baseline model. • At least 9 (preferably 12) months of performance period data are used to calculate annual savings.

iPQ.No	Correct Answer	Points	Explanation
3CMVP083	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Data collected for energy savings calculations can be used to improve or optimize the operation of the equipment on a real-time basis, thereby improving the benefit of the retrofit. For constant-load retrofits, on the other hand, continuous measurements may not be better than short-term ones. • Performing continuous measurements or periodic measurements at regular intervals will account for operating variations and result in reduced uncertainty in the savings delivered. Continuous measurements provide long-term persistence data on the energy use of the equipment or system. • Periodic spot or short-term measurements of factors are appropriate when variations in loads and operation are not expected. When variations are expected, it is appropriate to measure factors continuously.
3CMVP084	4	8	<p>Answer = 4 Option A necessitates the evaluation of both quality and management aspects.</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Option Savings and performance accuracy vary by method. The accuracy depends on estimates, equipment inventory, measurements, frequency, and sample size (if a sampled approach is taken). • Option A requires checking operation and performance. • Option A is suitable for simple ECMs whose baseline and post-installation conditions (e.g., equipment quantities and ratings like lamp wattages or motor kilowatts) account for a large portion of project uncertainty.
3CMVP085	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Energy savings values per individual measure are desired. • Interactive effects can be estimated using methods that do not involve long-term measurements.
3CMVP086	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Stipulating certain parameters in the M&V plan can align responsibilities, especially for the items no one controls. • Any unforeseen costs are paid by the party that caused the costs or by the party responsible for that risk area. • The responsible party estimates the tasks it will likely need to complete and the associated costs.
3CMVP087	4	8	<p>Answer =4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Calculation of savings for projects that have high uncertainty or highly variable characteristics • Verification of installed performance against manufacturer claims • A verified result which can be stated with confidence and can prove return on investment

iPQ.No	Correct Answer	Points	Explanation
3CMVP088	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> M&V is the process of using measurement to reliably determine actual savings for energy, demand, cost, and greenhouse gases within a site through an Energy Conservation Measure (ECM). Measurements are used to verify savings rather than applying deemed savings or theoretical engineering calculations, which are based on previous studies, manufacturer-provided information, or other indirect data. Savings are determined by comparing post-retrofit performance against a business as usual" forecast."
3CMVP089	3	8	<p>Answer = 3 "You cannot manage what you do not measure."</p> <p>Explanation: Energy monitoring and targeting are built on the principle of "You cannot manage what you do not measure."</p>
3CMVP090	4	8	<p>Answer = 4 Production reduction</p> <p>Explanation: Production reduction is not an element of an energy monitoring and targeting system.</p>
3CMVP091	4	8	<p>Answer = 4 None of the Above</p> <p>Explanation: Contribute to energy consumption</p> <ul style="list-style-type: none"> Production Working Hours Weather
3CMVP092	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> The level of control is substandard. The level of control exhibited is commendable.
3CMVP093	2	8	<p>Answer = 2 $Y=Mx+C$</p> <p>Explanation: $Y=Mx+C$</p>
3CMVP094	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> Production volume Process type Resources input

iPQ.No	Correct Answer	Points	Explanation
3CMVP095	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • The analysis fails to consider the concept of the time value of money. • The model fails to consider the fluctuating nature of yearly net cash inflows.
3CMVP096	3	17.4	<p>Answer = 3 Both</p> <p>Explanation:</p> <p>A widely used investment criterion, the simple payback period offers the following advantages:</p> <p>It is simple, both in concept and application. Obviously a shorter payback generally indicates a more attractive investment. It does not use tedious calculations.</p> <p>It favours projects, which generate substantial cash inflows in earlier years, and discriminates against projects, which bring substantial cash inflows in later years but not in earlier years.</p>
3CMVP097	3	8	<p>Answer = 3 Both</p> <p>Explanation:</p> <p>There is a clear dependence relationship between energy efficiency and maintenance. This operates at two levels: Initially, improving energy efficiency is most cost-effectively done in existing facilities through normal maintenance procedures Subsequently, unless maintenance is regularly undertaken, savings from installed technical measure, whether in new-build or existing facilities, may not be realized.</p>
3CMVP098	1	8	<p>Answer = 1 Energy-saving measures may provide long-term benefits. These measures increase asset value over time and do not need to be written off at fast discount rates.</p> <p>Explanation:</p> <p>The benefits arising from some energy-saving measures may continue long after their payback periods. Such measures do not need to be written off at fast discount rates but can be regarded as adding to the long-term value of the assets.</p>
3CMVP099	4	8	<p>Answer = 4 All of the above</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Simple payback period • Return on investment and internal rate of return • Net present value and cash flow

iPQ.No	Correct Answer	Points	Explanation
3CMVP100	3	8	<p>Answer = 3</p> <p>Both</p> <p>Explanation:</p> <ul style="list-style-type: none"> • Organizations typically give priority to investing in what they see as their core or profit-making activities in preference to energy efficiency. • Even when they do invest in saving energy, they tend to demand faster rates of return than they require from other kinds of investment.