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50001 Certified Professional (50001 CP)

Key Terminology Flashcards

172 Essential Terms • Based on Body of Knowledge & ISO 50001:2018

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1. Energy Performance Indicator (EnPI)

A measure or unit of energy performance defined by the organization. Used to monitor energy performance and demonstrate improvement against the energy baseline. (ISO 50001:2018)

2. Energy Baseline (EnB)

Quantitative reference(s) providing a basis for comparison of energy performance. Established from a specified period of time or conditions. (ISO 50001:2018)

3. Significant Energy Use (SEU)

Energy use accounting for substantial energy consumption and/or offering considerable potential for energy performance improvement, as determined by the organization. (ISO 50001:2018)

4. Normalization

The process of modifying energy data to account for relevant variables so that energy performance can be compared under equivalent conditions. Required when relevant variables significantly affect energy performance.

5. Relevant Variable

A quantifiable factor that significantly affects energy performance and routinely changes (e.g., production volume, heating degree days, occupancy).

6. Static Factor

A factor that significantly affects energy performance and does not routinely change (e.g., facility size, design, installed equipment). Major changes may require baseline revision.

7. Energy Review

Documented analysis of energy efficiency, energy use, and energy consumption based on data, leading to identification of SEUs and opportunities for improvement. (Clause 6.3)

8. Operational Control

Establishing and implementing criteria for the effective operation and maintenance of facilities, equipment, systems, and processes related to SEUs. (Clause 8.1)

9. Energy Performance Improvement

Improvement in measurable results related to energy efficiency, energy use, or energy consumption compared with the energy baseline. Core intended outcome of an EnMS.

10. High-Level Structure (HLS)

The common clause structure (Annex SL) used across ISO management system standards, enabling easier integration of ISO 50001 with other ISO standards.

11. PDCA Cycle

Plan-Do-Check-Act. The continuous improvement model underlying ISO 50001. Plan (clauses 4–6), Do (7–8), Check (9), Act (10).

12. Energy Policy

Statement by top management of the organization's intentions and direction related to its energy performance. Must include specific commitments. (Clause 5.2)

13. Energy Management System (EnMS)

A management system to establish an energy policy, objectives, energy targets, and action plans, and processes to achieve those objectives and targets.

14. Energy Performance

Measurable results related to energy efficiency, energy use, and energy consumption.

15. Energy Efficiency

Ratio or other quantitative relationship between an output of performance, service, goods, commodities, or energy, and an input of energy.

16. Energy Use

Manner or kind of application of energy (e.g., ventilation, lighting, heating, cooling, transportation, processes, production lines).

17. Energy Consumption

Quantity of energy applied.

18. Energy Target

Quantifiable energy performance requirement, arising from an energy objective, that needs to be set and met in order to achieve the objective.

19. Energy Objective

Specified outcome or achievement set to meet the organization's energy policy related to improved energy performance.

20. Action Plan

Plan detailing how an organization will achieve its energy objectives and energy targets.

21. Internal Audit

Systematic, independent, and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled. (Clause 9.2)

22. Management Review

Top management's review of the EnMS at planned intervals to ensure its continuing suitability, adequacy, effectiveness, and alignment with the strategic direction. (Clause 9.3)

23. Corrective Action

Action to eliminate the cause of a nonconformity and to prevent recurrence. (Clauses 10.1 and 10.2)

24. Nonconformity

Non-fulfillment of a requirement.

25. Major Nonconformity

A nonconformity that affects the capability of the EnMS to achieve the intended outcomes. Typically requires significant corrective action.

26. Minor Nonconformity

A nonconformity that does not affect the capability of the EnMS to achieve the intended outcomes. May be an isolated lapse.

27. Opportunity for Improvement (OFI)

A situation where the requirements of the standard are met, but potential exists for improved efficiency or effectiveness.

28. Documented Information

Information required to be controlled and maintained by an organization and the medium on which it is contained. (Clause 7.5)

29. Competence

Ability to apply knowledge and skills to achieve intended results. (Clause 7.2)

30. Awareness

Understanding by persons of the energy policy, their contribution to the effectiveness of the EnMS, and the implications of not conforming. (Clause 7.3)

31. Context of the Organization

Understanding of the organization and its context, including internal and external issues relevant to its purpose and that affect its ability to achieve the intended outcomes of the EnMS. (Clause 4.1)

32. Interested Parties

Person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity. (Clause 4.2)

33. Scope of the EnMS

Boundaries and applicability of the energy management system, including energy types and activities under the organization's control. (Clause 4.3)

34. Top Management

Person or group of people who directs and controls an organization at the highest level.

35. Energy Data Collection Plan

Plan that defines the data needed to monitor energy performance, including what, how, when, and by whom data will be collected. (Clause 6.6)

36. Interactive Effects

The impact of one energy improvement measure on the energy savings of another measure. Must be considered when estimating combined savings.

37. Control Chart

A statistical tool used to monitor a process and distinguish between common-cause and special-cause variation in energy data.

38. Coefficient of Variation

A statistical measure of relative variability, useful for comparing the variability of energy data across different SEUs or periods.

39. Regression Analysis

A statistical method used to establish the relationship between energy consumption and relevant variables for baseline development and normalization.

40. R-squared (R^2)

A statistical measure of how well a regression model fits the data. Higher values indicate a better fit for baseline models.

41. Stage 1 Audit

Initial certification audit stage that reviews documentation and readiness of the EnMS to determine if the organization is prepared for Stage 2.

42. Stage 2 Audit

Certification audit stage that evaluates the implementation and effectiveness of the EnMS and whether energy performance improvement is being achieved.

43. Surveillance Audit

Periodic audit conducted to confirm continued conformity and ongoing energy performance improvement after certification.

44. Recertification Audit

Audit conducted at the end of a certification cycle to renew the certificate.

45. ISO 50003

Standard that specifies requirements for bodies providing audit and certification of energy management systems, including audit time calculation.

46. ISO 50004

Guidance for the implementation, maintenance, and improvement of an energy management system.

47. ISO 50006

Guidance for establishing, using, and maintaining energy performance indicators and energy baselines.

48. ISO 50015

Principles and guidelines for measurement and verification of energy performance of organizations.

49. Independence

The requirement that certification auditors remain impartial and free from conflicts of interest, including not providing consultancy to the audited organization.

50. Legal and Other Requirements

Applicable legal requirements and other requirements related to energy efficiency, energy use, and energy consumption that the organization must identify and evaluate compliance with. (Clause 4.2 / 9.1.2)

51. Energy Management Team

Person(s) with responsibility and authority for ensuring the EnMS is established, implemented, maintained, and continually improved.

52. Continual Improvement

Recurring activity to enhance performance. A required commitment in the energy policy for both energy performance and the EnMS.

53. Risks and Opportunities

Potential adverse effects (risks) and potential beneficial effects (opportunities) that need to be addressed to ensure the EnMS can achieve its intended outcomes. (Clause 6.1)

54. Design

Consideration of energy performance improvement opportunities in the design of new, modified, or renovated facilities, equipment, systems, and processes. (Clause 8.2)

55. Procurement

Consideration of energy performance when procuring energy services, products, equipment, and energy. (Clause 8.3)

56. Monitoring, Measurement, Analysis and Evaluation

Determining what needs to be monitored and measured, the methods, when, and who will analyze and evaluate energy performance. (Clause 9.1)

57. Evaluation of Compliance

Evaluating fulfillment of legal and other requirements related to energy. (Clause 9.1.2)

58. Root Cause Analysis

The process of identifying the underlying cause(s) of a nonconformity so that effective corrective action can be taken.

59. Effectiveness

Extent to which planned activities are realized and planned results are achieved.

60. Intended Outcomes

The results an organization intends to achieve by implementing its EnMS, primarily improved energy performance and the EnMS itself.

61. Boundary

Physical or organizational limits as defined by the organization.

62. Energy Types

Forms of energy used by the organization (e.g., electricity, natural gas, steam, fuel oil, renewable energy).

63. Submetering

Installation of meters to measure energy consumption at the SEU or process level, beyond the main utility meters.

64. Heating Degree Days (HDD)

A measure of how much (in degrees) and for how long (in days) the outside air temperature was below a certain base temperature. Used as a relevant variable for heating energy.

65. Cooling Degree Days (CDD)

A measure of how much and for how long the outside air temperature was above a certain base temperature. Used as a relevant variable for cooling energy.

66. Affinity Laws

Relationships that describe how flow, pressure, and power change with speed in fans and pumps. Power varies with the cube of speed.

67. Sankey Diagram

A flow diagram in which the width of the arrows is proportional to the flow quantity. Used to visualize energy flows and identify losses.

68. Energy Balance

Application of the law of conservation of energy: energy input equals useful energy output plus losses.

69. Luminous Efficacy

A measure of how well a light source produces visible light, typically expressed in lumens per watt (lm/W).

70. Measurement and Verification (M&V;)

The process of quantifying the energy performance improvement from an energy conservation measure or project.

71. Building Automation System (BAS)

A computerized system that controls and monitors a building's mechanical and electrical equipment, including HVAC and lighting, to support energy performance.

72. Variable Speed Drive (VSD)

A device that controls the speed of an electric motor by varying the frequency and voltage supplied to it, often used to reduce energy consumption in fans and pumps.

73. Compressed Air System

A system that generates and distributes compressed air, often identified as an SEU due to inefficiency from leaks and part-load operation.

74. Steam System

A system that generates and distributes steam for heating or process use, subject to energy balance analysis for efficiency.

75. Chiller

A machine that removes heat from a liquid via a vapor-compression or absorption refrigeration cycle, commonly an SEU in commercial buildings.

76. Cooling Tower

A heat rejection device that extracts waste heat to the atmosphere through the cooling of a water stream. Control relative to wet-bulb temperature affects efficiency.

77. Power Factor

The ratio of real power to apparent power in an electrical system. Low power factor can result in utility penalties.

78. Demand Charge

A charge on a utility bill based on the peak power demand during a billing period, independent of total energy consumption.

79. Load Factor

The ratio of average power demand to peak power demand over a period. Higher load factors generally indicate more efficient energy use.

80. Energy Intensity

Energy consumption per unit of output or activity (e.g., kWh per square meter, kWh per unit of production).

81. Baseline Period

The specific period of time from which data are used to establish the energy baseline.

82. Reporting Period

The period of time after the baseline period during which energy performance is measured and compared to the baseline.

83. Model Validity

The statistical and practical appropriateness of a regression or other model used for a baseline or EnPI.

84. Residuals

The differences between actual and predicted values in a regression model. Randomly distributed residuals support model validity.

85. Special Cause Variation

Variation in a process that is not inherent and is assignable to a specific cause, often indicated by control chart patterns.

86. Common Cause Variation

The inherent variation in a stable process, within control limits on a control chart.

87. Gap Assessment

An evaluation of an organization's current practices against the requirements of ISO 50001 to identify areas needing improvement before certification.

88. Certification Body

An organization that provides third-party certification of energy management systems against ISO 50001.

89. Lead Auditor

The auditor responsible for managing the audit team and the audit process.

90. Audit Criteria

The set of policies, procedures, or requirements used as a reference against which audit evidence is compared.

91. Audit Evidence

Records, statements of fact, or other information that are relevant to the audit criteria and verifiable.

92. Audit Findings

Results of the evaluation of the collected audit evidence against audit criteria. Can be conformity, nonconformity, or opportunity for improvement.

93. Closing Meeting

The final meeting of an audit where findings are presented to the auditee.

94. Corrective Action Request (CAR)

A formal request issued when a nonconformity is identified, requiring the organization to take corrective action.

95. Preventive Action

Action to eliminate the cause of a potential nonconformity. (Note: less emphasized in ISO 50001:2018 than in previous versions.)

96. Document Control

The process of ensuring that documented information is available, suitable for use, and adequately protected. (Clause 7.5)

97. Record

Document stating results achieved or providing evidence of activities performed.

98. Procedure

Specified way to carry out an activity or a process.

99. Process

Set of interrelated or interacting activities that use inputs to deliver an intended result.

100. Outsourced Process

A process that the organization has identified as necessary for its EnMS and which is performed by an external organization.

101. Change Management

The process of managing changes to the EnMS or to energy-using systems to ensure energy performance is maintained or improved.

102. Energy Team Leader

The person with overall responsibility for coordinating the energy management team and the EnMS.

103. Roles, Responsibilities and Authorities

The defined duties and decision-making powers assigned to personnel to ensure the EnMS is effective.
(Clause 5.3)

104. Communication

The process of providing and obtaining information relevant to the EnMS, both internally and externally.
(Clause 7.4)

105. Training

Activities to develop competence of persons whose work affects energy performance.

106. Calibration

The process of verifying and adjusting measurement equipment to ensure accuracy of energy data.

107. Uncertainty

The range of possible values within which the true value of a measurement is estimated to lie. Important for data quality.

108. Data Quality

The fitness of energy data for its intended use, including accuracy, completeness, and consistency.

109. Sub-meter

A meter installed downstream of the main utility meter to measure energy use of a specific SEU or area.

110. Interval Data

Energy consumption data recorded at regular short intervals (e.g., 15-minute), useful for identifying patterns and opportunities.

111. Weather Normalization

Adjusting energy consumption data to account for variations in weather (using HDD or CDD) so that performance can be compared fairly.

112. Production Normalization

Adjusting energy consumption data to account for variations in production volume so that energy performance can be compared fairly.

113. CUSUM

Cumulative Sum chart, a statistical tool used to detect small shifts in energy performance over time.

114. Benchmarking

Comparing an organization's energy performance against similar organizations or best-in-class performance.

115. Energy Audit

A systematic inspection and analysis of energy use and consumption of a site or organization to identify opportunities for improvement. (Related to ISO 50002)

116. ISO 50002

Standard providing guidance on energy audits.

117. Superior Energy Performance (SEP)

A certification program that requires ISO 50001 plus verified energy performance improvement.

118. 50001 Ready

A U.S. DOE program that provides tools and guidance for organizations to implement an EnMS based on ISO 50001.

119. EnPI Lite

A U.S. DOE tool used to develop energy performance indicators and baselines.

120. Energy Footprint Tool

A tool used to quantify an organization's energy consumption across different energy types and uses.

121. Scope 1 Emissions

Direct greenhouse gas emissions from sources owned or controlled by the organization (related but distinct from energy management).

122. Scope 2 Emissions

Indirect greenhouse gas emissions from the generation of purchased energy.

123. Renewable Energy

Energy from sources that are naturally replenished, such as solar, wind, or biomass.

124. Combined Heat and Power (CHP)

The simultaneous generation of useful heat and electricity from a single fuel source, improving overall efficiency.

125. Heat Recovery

The process of capturing and reusing waste heat that would otherwise be lost.

126. Insulation

Material used to reduce heat transfer, improving energy efficiency in buildings and process equipment.

127. Setpoint

The desired value of a controlled variable (e.g., temperature, pressure) in a control system.

128. Deadband

The range of values within which a control system does not take action, used to prevent excessive cycling.

129. Economizer

A device or control strategy that uses outdoor air for cooling when conditions are favorable, reducing mechanical cooling energy.

130. Variable Air Volume (VAV)

An HVAC system that varies the airflow to spaces based on demand, improving energy efficiency compared to constant volume systems.

131. Constant Air Volume (CAV)

An HVAC system that supplies a constant volume of air, less efficient than VAV systems in many applications.

132. Boiler Efficiency

The ratio of useful heat output to energy input in a boiler, typically determined through energy balance analysis.

133. Flue Gas Losses

Energy lost in the exhaust gases from a combustion process, a major factor in boiler and furnace efficiency.

134. Blowdown

The removal of water from a boiler to control the concentration of dissolved solids, which represents an energy loss.

135. Steam Trap

A device that allows condensate to be removed from a steam system while preventing the loss of live steam.

136. Leak

Unintended escape of a fluid (e.g., compressed air, steam, water) that results in energy waste.

137. Part-Load Operation

Operating equipment at less than its full rated capacity, which can significantly reduce efficiency in some systems (e.g., fixed-speed compressors).

138. Motor Efficiency

The ratio of mechanical power output to electrical power input for an electric motor.

139. Premium Efficiency Motor

A motor that meets higher efficiency standards than standard motors, reducing energy consumption.

140. Power Quality

The characteristics of the electrical supply that affect the performance of equipment, including voltage, frequency, and harmonics.

141. Harmonics

Distortions in the electrical waveform that can increase energy losses and affect equipment.

142. Peak Demand

The highest rate of energy consumption during a billing period, often used for demand charges.

143. Off-Peak

Periods of lower energy demand, often with lower utility rates.

144. Time-of-Use Rates

Utility pricing that varies based on the time of day, encouraging shifting of energy use to lower-cost periods.

145. Demand Response

Programs that incentivize customers to reduce energy use during peak periods.

146. Energy Storage

Technologies that store energy for later use, such as batteries or thermal storage, which can support demand management.

147. Commissioning

The process of verifying that building systems are installed and operating as designed, important for energy performance.

148. Retro-commissioning

The process of improving the operation of existing building systems to enhance energy performance.

149. Continuous Commissioning

An ongoing process of monitoring and optimizing building systems for energy performance.

150. Measurement Boundary

The boundary within which energy performance is measured and reported.

151. Adjustment

A modification to the baseline or EnPI to account for changes in static factors or other conditions.

152. Non-routine Adjustment

An adjustment made to account for unusual or one-time events that affect energy performance.

153. Routine Adjustment

An adjustment made regularly to account for relevant variables that routinely change.

154. Model

A mathematical representation of the relationship between energy consumption and relevant variables, used for baselines and prediction.

155. Validation

The process of confirming that a model or EnPI is appropriate and accurate for its intended use.

156. Verification

The process of confirming that energy performance improvement has been achieved.

157. Uncertainty Analysis

The evaluation of the range of possible error in energy savings or performance calculations.

158. IPMVP

International Performance Measurement and Verification Protocol, a framework for measuring and verifying energy savings.

159. Option A (IPMVP)

An M&V; approach that uses partial measurement of key parameters.

160. Option B (IPMVP)

An M&V; approach that uses full measurement of all parameters.

161. Option C (IPMVP)

An M&V; approach that uses whole-facility measurement.

162. Option D (IPMVP)

An M&V; approach that uses calibrated simulation.

163. Baseline Adjustment

A change to the energy baseline to account for changes in static factors or other conditions so that it remains a valid reference.

164. Energy Performance Model

A mathematical model that predicts expected energy consumption based on relevant variables, used to evaluate performance.

165. Significant Deviation

A change in energy performance that exceeds expected variation and requires investigation.

166. Energy Review Update

The periodic or triggered review and revision of the energy review to reflect changes in the organization or its energy use.

167. Action Plan Monitoring

The process of tracking the implementation and effectiveness of energy action plans.

168. Resource Allocation

The assignment of people, equipment, and budget needed to implement and maintain the EnMS and achieve energy objectives.

169. Strategic Direction

The organization's overall goals and priorities, with which the energy policy and EnMS must be aligned.

170. Integration

The process of combining the EnMS with other management systems (e.g., ISO 9001, ISO 14001) while preserving energy-specific requirements.

171. Bureaucracy

Excessive administrative processes that do not contribute to energy performance improvement. Effective EnMS implementation seeks to minimize unnecessary bureaucracy.

172. Value Delivery

The ability of the EnMS to produce measurable energy performance improvement and support organizational objectives, rather than existing only as documentation.