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Standard Guide for Building Energy Performance and Improvement Evaluation in the Assessment of Property Condition¹

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1. Scope

1.1 *Purpose*—The purpose of this guide is to define a commercially useful standard in the United States of America for incorporating building energy performance into an assessment of existing property condition, and specifically into a property condition assessment (PCA) on a building involved in a commercial real estate transaction. The guide is intended to provide a methodology for the user to identify building energy under-performance compared to peer buildings. If the building is under-performing compared to its peers, a methodology is provided to identify potential energy performance improvements and provide a probable cost for such improvements. The guide may be used independently or as a voluntary supplement to ASTM Guide E2018 PCA. Utilization of this guide and incorporating it into a PCA is voluntary. If the property owner is unwilling or unable to provide building energy consumption information and it is not possible to develop a reasonable estimate of building energy consumption, the methodology defined by this guide cannot be performed.

1.2 *Building Energy Performance and Improvement Evaluation (BEPIE)*—the process as described in this guide by which a person collects, analyzes and reports on a building's energy consumption, compares it to peer buildings and determines if the building is under-performing. If the building is under-performing, potential major improvements (energy efficiency measures, EEMs) that may reduce building energy consumption to achieve parity with peer buildings are identified and a probable cost is provided. Building energy performance as defined by this guide involves the collection of annual whole building energy consumption for heating, cooling, ventilation, lighting, and other related energy-consuming end-uses. Building energy consumption, for example, includes total electricity used at the building; purchased or delivered steam, hot water, or chilled water to the building; natural gas, fuel oil, propane, biomass, or any other matter consumed as fuel at the building. Annual whole building energy consumption in kBtu/yr is

weather-normalized and converted to energy use intensity (EUI, kBtu/SF-yr), and then benchmarked against weather-normalized energy consumption in peer buildings. If the building consumes more energy than peer buildings, it is assumed to be under-performing. For under-performing buildings, the methodology provided in this guide identifies potential energy improvements and associated costs that may be able to bring the building to parity with peers. If electricity is generated on site from renewable/alternative energy systems (for example, solar photovoltaic systems, wind energy generator technology, fuel cells, or microturbines), the electricity produced is considered energy savings and is netted against building energy requirements with the purpose of reducing building EUI. The assessment conducted for the BEPIE may be a Screening Assessment (SA) that might be conducted in due diligence prior to building acquisition, or a More Comprehensive Assessment (MCA) that might be conducted by the owner of a building who may have had an SA conducted prior to acquiring the building. A BEPIE as performed according to this guide is building- and site-specific. For multifamily type property, the BEPIE is property-specific where a property may include multiple buildings. For such cases, data from the multiple buildings are aggregated prior to analysis.

1.3 *Objectives*—Objectives in the development of this guide are to: (1) define a commercially useful guide for incorporating building energy performance into the assessment of existing property condition as part of due diligence associated with real estate transactions conducted pre-acquisition, post-acquisition or independent of an acquisition; (2) identify buildings that consume more energy than their peers, that is, are under-performing relative to peers; (3) identify how under-performing buildings might be improved and provide a probable cost to bring under-performing buildings to parity with peers; (4) define a commercially useful and reliable guide for conducting a building energy performance and improvement evaluation; (5) facilitate consistency in conducting and reporting of building energy performance and the evaluation of measures that may improve energy performance; (6) provide a process for conducting a BEPIE that is technically sound, consistent, transparent, practical and reasonable; and (7) provide criterion for identifying what constitutes a building being considered an energy under-performer compared to its peers.

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1.4 *Documentation*—The scope of this guide includes data collection, compilation, analysis and reporting. All sources, records and resources relied upon in the *BEPIE* assessment should to be documented.

1.5 *Considerations Outside the Scope*—The use of this guide is limited to the conduct of a *BEPIE* as defined by this guide. While this information may be used in assessing building valuation or for other reasons, any such use is solely between the *user* and the *Consultant* and beyond the scope of this guide.

1.6 *Organization of the Guide*—*BEPIE* has 14 sections and 12 appendices. The appendices are included for informational purposes only and are provided for guidance in implementing this guide.

Section 1	Describes the scope of the guide.
Section 2	Identifies referenced documents.
Section 3	Provides terminology pertinent to the guide.
Section 4	Discusses the significance and use of the guide.
Section 5	Discusses the relationship between this guide and ASTM E2018, ASTM E2797 and ASHRAE 211.
Section 6	Describes the user's responsibilities under this guide.
Section 7	Describes the data collection needs for this guide.
Section 8	Describes the building energy performance and improvement evaluation process.
Section 9	Describes the benchmarking process.
Section 10	Describes the process for conducting a screening assessment.
Section 11	Describes the more comprehensive assessment process.
Section 12	Describes reporting of findings and conclusions.
Section 13	Identifies non-scope considerations.
Section 14	Identifies keywords associated with the guide.
Appendix X1	Driving Forces for Considering Building Energy Performance in PCAs.
Appendix X2	Common Commercial Building Types.
Appendix X3	EPA Portfolio Manager.
Appendix X4	Commercial (CBECS) and Residential (RECS) Building Energy Consumption Surveys.
Appendix X5	U.S. Climate Zones.
Appendix X6	Building Performance Database.
Appendix X7	EULs of Common Energy-consuming Equipment.
Appendix X8	EEM Replacement Schedule Considerations.
Appendix X9	Energy Savings for Common EEMs.
Appendix X10	Common Energy and Water Savings Measures.
Appendix X11	Building Energy Performance and Sustainability Certifications.
Appendix X12	Sample <i>BEPIE</i> Screening Assessment Report Format

1.7 *This guide cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM guide is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this guide be applied without consideration of a building's many unique aspects. The word "standard" in the title means only that the guide has been approved through the ASTM consensus process.*

1.8 *Nothing in this guide is intended to create or imply the existence of a legal obligation for reporting building energy performance or other building-related information. Any consideration of whether such an obligation exists under any federal, state, local, or common law is beyond the scope of this guide.*

1.9 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.10 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

E2018 Guide for Property Condition Assessments: Baseline Property Condition Assessment Process

E2797 Practice for Building Energy Performance Assessment for a Building Involved in a Real Estate Transaction

2.2 ASHRAE Standards:³

ASHRAE/ACCA Standard 211 Standard for Commercial Building Energy Audits

ASHRAE Standard 189.1 ASHRAE Standard 189.1, Standard for the Design of High-Performance Green Buildings

ASHRAE 90.1 Energy Standard for Buildings Except Low-Rise Residential Buildings

ASHRAE Handbook Fundamentals, 2017

ASHRAE Handbook HVAC Systems and Equipment, 2016

ASHRAE, 2011 Procedures for Commercial Building Energy Audits, 2nd Edition

ASHRAE Equipment Service Life Database (<https://xp20.ashrae.org/publicdatabase/>)

2.3 Other References:

DSIRE Database of Federal, State, Local Government and Utility Incentives for Renewable Energy and Energy Efficiency (<http://www.dsireusa.org>)

Fannie Mae High Performance Building Module Protocol (refer to Section 5.08 of Fannie Mae Form 4099, Instructions for Performing a Multifamily Property Condition Assessment, June 2019)

Fannie Mae Energy and Water Survey Database (<https://www.fanniemae.com/multifamily/green-initiative-market-research-survey>)

Federal Energy Management Program Energy- and Cost-Savings Calculators (<https://www.energy.gov/eere/femp/energy-and-cost-savings-calculators-energy-efficient-products>)

RS Means Green Building Costs, 2019

U.S. DOE 2011 Buildings Energy Data Book, last revised September 2017

U.S. DOE Building Performance Database Office of Energy Efficiency and Renewable Energy (<https://www.energy.gov/eere/buildings/building-performance-database-bpd>)

U.S. DOE Commercial Buildings Energy Consumption Survey (CBECS) 2012 (<https://www.eia.gov/consumption/commercial/data/2012/>)

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.

- U.S. DOE Residential Energy Consumption Survey (RECS) 2015 (<https://www.eia.gov/consumption/residential/data/2015/>)
- U.S. EPA, ENERGY STAR® Portfolio Manager Commercial Property Benchmarking (<https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>)
- U.S. EPA, ENERGY STAR® Portfolio Manager Multifamily Property Energy Consumption Benchmarking (https://www.energystar.gov/buildings/owners_and_managers/existingbuildings/find_resources_your_property_type/energy_star_multifamily_housing)
- U.S. EPA, ENERGY STAR® Portfolio Manager Multifamily Property Water Use Benchmarking (<https://portfoliomanager.zendesk.com/hc/en-us/categories/202438517-Water-Benchmarking>)
- U.S. EPA, WaterSense™ Multifamily Housing Water Assessment Worksheets, Version 1, October 2018
- U.S. EPA, WaterSense™ Water Efficiency Management Guide, Bathroom Suite, EPA 832-F-17-016d, November 2017
- U.S. EPA, WaterSense™ Water Efficiency Management Guide, Residential Kitchen and Laundry, EPA 832-F-17-016b, November 2017
- U.S. EPA, WaterSense™ Water Efficiency Management Guide, Landscaping and Irrigation, EPA 832-F-17-016b, November 2017
- U.S. EPA, WaterSense™ Water Efficiency Management Guide, Mechanical Systems, EPA 832-F-17-016c, November 2017

3. Terminology

3.1 *Definitions*—This section provides definitions and descriptions of terms and a list of acronyms for keywords used in this guide. The terms are an integral part of this guide and are critical to an understanding of the guide and its use.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *actual knowledge, n*—the knowledge possessed by an individual rather than an entity. *Actual knowledge*, as used in this guide, is to be distinguished from knowledge provided by others, or information contained in documents obtained in performing a *BEPIE*.

3.2.2 *adjusted energy use intensity (EUI-a), n*—site *EUI* as described in 3.2.19 adjusted by incorporating the 10 % *variability allowance* (see 3.2.46). If the median (50th percentile) *EUI* of *peer* buildings is 60 kBtu/SF-yr, the acceptable upper range for the median *EUI* of *peer* buildings is 66 kBtu/SF-yr, that is, the *EUI-a*. Hence, if the building *EUI* is 66 kBtu/SF-yr or less, the guide would not consider the building as *underperforming*.

3.2.3 *building energy performance and improvement evaluation (BEPIE), n*—the process as described in this guide by which a person collects, analyzes and reports on a building's *energy consumption*, compares its weather-normalized *EUI* to *peer* buildings and determines if the building is *underperforming*. If the building is *underperforming*, potential energy improvements that may reduce building *energy con-*

sumption to achieve parity with *peer* buildings are identified and a probable cost provided.

3.2.4 *building performance database (BPD), n*—maintained by the U.S. DOE, the *BPD* is the nation's largest dataset of information about the energy-related characteristics of commercial and residential buildings (refer to Appendix X6). The *BPD* combines, cleanses and anonymizes data collected by federal, state and local governments, utilities, energy efficiency programs, building owners and private companies, and makes it available to the public. The website allows individuals to explore the data across real estate sectors and regions, and compare various physical and operational characteristics to gain a better understanding of market conditions and trends in energy performance. Basic building information and *energy consumption* data can be used to compare to similar buildings and identify high and low performers. The *BPD* can be used to analyze trends within custom-defined local *peer* groups for specific real estate sub-markets. The website may be accessed at: <https://www.energy.gov/eere/buildings/building-performance-database>.

3.2.5 *climate zone, n*—zones with common weather characteristics. ASHRAE 90.1 and the IECC divide the U.S. into eight (8) *climate zones* and three (3) moisture regions (A, B and C). The 2003 CBECs divided the U.S. into 5 climatically homogeneous zones, as defined by the National Oceanic and Atmospheric Administration (NOAA). Each NOAA climate division was based on its 30-year average *heating degree-days (HDD)* and cooling degree-days (*CDD*) for the period 1971 through 2000. The 2012 CBECs no longer uses historical *HDD-* and *CDD-based climate zones* and is instead using climate regions created by the Building America program, sponsored by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE). (Refer to Appendix X5.)

3.2.6 *commercial real estate, n*—improved real property, except a dwelling or property with four or less dwelling units exclusively for residential use. The term includes, but is not limited to, improved real property used for retail, office, industrial, hospitality, agricultural, or other commercial, medical or educational purposes; property used for residential purposes that has five or more residential dwelling units.

3.2.7 *commercial real estate transaction, n*—a transfer of title to or possession of *commercial real estate*, rental of space in *commercial real estate* under a lease for a set period of time in return for consideration, a transfer of a leasehold interest in *commercial real estate*, or receipt of a security interest in *commercial real estate*, except that it does not include such transactions with respect to an individual dwelling, or a building containing four or less dwelling units, unless used for commercial purposes such as the operation of such dwellings for profit.

3.2.8 *Consultant, n*—a person qualified to perform the *SA* or *MCA* in this guide. (Refer to 3.2.26, 3.2.39 and 8.6.)

3.2.9 *cooling degree-days (CDD), n*—for each day with an average temperature higher than 65 °F (18.3 °C), *CDD* is the difference between the average temperature and 65 °F (18.3 °C). For example, on a day with a mean temperature of

80 °F (26.6 °C), 15 *CDD* would be recorded. *CDD* data by month and region is published by the Energy Information Administration. *CDD* historical data by month and region is published by the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service Climate Prediction Center, Camp Springs, MD for 200 major weather stations around the country, and by others, including NOAA's National Climatic Data Center in Ashville, NC. Information is also available at <http://www.degreedays.net>.

3.2.10 *data gap, n*—lack of or inability to collect information required by this guide despite good faith efforts by the person or entity seeking to gather such information. *Data gaps* may result from incompleteness in any of the activities associated with this guide, including, but not limited to the collection of a minimum of one year (twelve months) of historical building *energy consumption* data. Every effort should be made to resolve any significant *data gap* issue that is material to conducting the *BEPIE*.

3.2.11 *district energy, n*—is *secondary energy* that is generated off site and delivered to a facility in the form of steam, hot water, or chilled water.

3.2.12 *easily visible, adj*—describes observations of items, components and systems that are conspicuous, apparent, and obvious during the walk-through without: intrusion, relocation or removal of materials, exploratory probing, use of special protective clothing, or use of any equipment (such as hand tools, meters of any kind, ladders, and so forth). (Refer to [E2018](#).)

3.2.13 *end-use, n*—describes major energy-consuming uses in a building, including but not limited to: space heating, space cooling, ventilation, lighting, domestic hot water heating, refrigeration, cooking, office equipment, computers and miscellaneous. The Commercial Buildings Energy Consumption Survey (CBECS) and Residential Energy Consumption Survey (RECS) are excellent sources to begin to obtain insight into the *energy consumption* associated with major building *end-uses* as a function of property type in different *climate zones*. Utility *Technical Resource Manuals* (refer to [Appendix X9](#)) may also be a source for *end-use energy consumption* data.

3.2.14 *energy efficiency measure (EEM), n*—a measure (such as a high efficiency condensing boiler or high efficiency packaged air conditioner or LED lighting) that may be installed, or an operational change (such as modifying the set-back temperature) that may be implemented in a building, to reduce *energy consumption*.

3.2.15 *energy consumption, n*—total electricity, natural gas, heating oil, district steam, district hot water, district cooling water, propane, and so forth, used by a building for heating, cooling, lighting, powering, or fueling *end-uses*. Energy generated on-site by *renewable energy* sources such as solar and wind should be identified separately (as energy generated on-site by renewable sources may be netted out when determining building *energy consumption*). *Energy consumption* may be applied to *energy efficiency measures (EEMs)*, whole buildings, building *end-uses*, or energy sources, for example, electricity or fuel. The units of whole building *energy consumption* (also referred to as *site energy consumption*), for

example, are typically in thousands of BTU per year (kBTU/yr or kBTU/SF-yr). The units of building electricity *energy consumption*, for example, are typically in kWh per year or kWh/SF-yr. *Energy consumption* as described in this guide refers to *site energy consumption*, unless noted otherwise.

3.2.16 *energy performance, n*—annual building or property electricity (kWh/yr) and fuel (MM BTU/yr) *energy consumption*, excluding parking area *energy consumption*, for example, pole lighting and, if applicable, parking area ventilation. *Energy performance* may be in units of total energy consumed annually, for example, MM BTU/yr, or as energy use intensity, that is, kBTU/SF-yr. *Energy performance* is typically associated with a specific twelve month period (or thirteen months if needed to get a full year of *energy consumption* data) and may be weather-normalized.

3.2.17 *ENERGY STAR®, n*—a voluntary program launched by the U.S. Environmental Protection Agency (EPA) and now managed by the EPA and U.S. Department of Energy (DOE) designed to assist businesses and individuals reduce energy costs and protect the environment through higher energy efficiency.

3.2.18 *ENERGY STAR® certification, n*—a building can apply for an *ENERGY STAR® certification* within EPA Portfolio Manager if its *ENERGY STAR®* score is 75 or higher, indicating that it performs (that is, has an *EUI*) better than 75 % of similar buildings nationwide. The information submitted in the application must be third party-verified annually by a licensed Professional Engineer (PE) or Registered Architect (RA). If verification has not taken place within the prior twelve months, the *ENERGY STAR® certification* for a building is no longer active.

3.2.19 *energy use intensity (EUI), n*—whole building annual *energy consumption* divided by the building's *gross floor area*; also referred to as *site EUI*. The units of building *energy use intensity* are typically kBTU/SF-yr. When used for benchmarking, the *EUI* is weather-normalized. *EUI* is associated with a building having a specific property use (may also be referred to as specific property type) with characteristics or other factors that may facilitate comparison with similar use (or type) buildings having similar characteristics. *EUI* as described in this guide is determined on a *site energy consumption* basis.

3.2.20 *estimated useful life (EUL), n*—the median length of time (in years) that an *energy efficiency measure* is functional or considered practically useable without incurring significant operational and maintenance penalties. Many factors may affect measure lifetime, including but not limited to delivery method, initial equipment sizing, maintenance standards, operating conditions and operating hours. The *EUL* is also used to determine the length of time over which the benefits of an *energy efficiency measure* may be expected to accrue. (Refer to [Appendix X7](#).)

3.2.21 *geographic, adj*—for this guide, *geographic* refers to an area defined within the bounds of a county. When comparing a building's *EUI* to *peer* buildings, it is preferable that *peer* buildings be located in the same *geographic* area as the building being evaluated.

3.2.22 *gross floor area (GFA), n*—area (in square feet) on all floor levels within the perimeter of the outside walls of a building as measured from the outside surface of the exterior walls, with no deduction for hallways, stairs, closets, columns, or other interior features, excluding parking area. *Gross floor area* is distinguished from the gross leasable or rentable area (GRA), which is the occupied area on all floor levels for which a tenant is charged for occupancy under a lease. Leasable area may exclude common areas (such as lobbies and foyers, stairways and elevators, corridors and passages, mechanical rooms, rest rooms, and so forth). Only *gross floor area* is used in the energy metrics associated with this guide, for example, in the determination of *EUI*.

3.2.23 *heating degree-days (HDD), n*—for each day with an average temperature lower than 65 °F (18.3 °C), *HDD* is the difference between the average temperature and 65 °F (18.3 °C). For example, on a day with a mean temperature of 40 °F (4.4 °C), 25 *HDD* would be recorded. *HDD* data by month and region is published by the Energy Information Administration. *HDD* historical data by month and region is published by NOAA’s National Weather Service Climate Prediction Center, Camp Springs, MD for 200 major weather stations around the country, and by others, including NOAA’s National Climatic Data Center in Ashville, NC. Information is also available at <http://www.degreedays.net>.

3.2.24 *LEED®*, *n*—Leadership in Energy and Environmental Design certification for buildings developed by the non-profit U.S. Green Building Council (USGBC). It includes a set of rating systems for the design, construction, operation, and maintenance of green buildings to help building owners and operators be environmentally responsible and use resources efficiently. The rating system is credit-based, allowing projects to earn points for environmentally friendly actions taken during construction and operation of a building. The more points earned, the higher the rating (Certified: 40-49 points, Silver: 50-59 points, Gold: 70-79 points, and Platinum: 80-110 points). The point system includes many considerations in addition to a building’s *energy performance*. As such, even though the building has gone through the comprehensive third-party *LEED®* certification process, the building cannot automatically be considered as highly energy efficient.

3.2.25 *major renovation, n*—building renovation that either involves expansion (or reduction) of the building’s *gross floor area* by 10 % or more or impacts whole building *energy consumption* by more than 10 %.

3.2.26 *More Comprehensive Assessment (MCA), n*—the process described in Section 11. The *MCA* may be performed after an *SA* (refer to 3.2.39) has been conducted or independent of an *SA*.

3.2.27 *normalize, v*—to reduce to a norm, such as *normalizing building energy consumption* by removing the influence of weather, for example, *HDD* and *CDD*, or factoring in building size, for example, *GFA*. To *normalize* a whole building’s *energy consumption* for a specific twelve month period (in kBtu/yr) to remove the influence of weather, the *HDD* and *CDD* associated with the specific twelve month period, and the long-term average *HDD* and *CDD*, can be used

to correct space heating and space cooling *energy consumption end-uses* (refer to 9.8.3 and 9.8.4).

3.2.28 *peer, n*—as used in this guide, a similar type building with similar use, preferably in the same *geographic area* or *climate zone*. When used in the process of benchmarking, the *energy consumption* of *peer* buildings is statistically analyzed to determine the median (50th percentile). A 10 % *variability allowance* is factored around the median such that the median constitutes a range rather than a discrete point.

3.2.29 *practically reviewable, adj*—information that is provided by the source in a manner and in a form that, upon examination, yields information relevant to the property without the need for extraordinary analysis of irrelevant data.

3.2.30 *primary energy, n*—raw fuel, such as natural gas or fuel oil, that is burned on-site at a building to create heat and/or electricity.

3.2.31 *property condition assessment (PCA), n*—process by which a person or entity observes a property, interviews sources, and reviews available documentation for the purpose of developing an opinion about a property’s current physical condition. (Refer to E2018.)

3.2.32 *readily accessible, adj*—describes *easily visible* areas of a property that are promptly made available for observation by the *Consultant* or individual conducting the walk-through survey and does not require removal or relocation of materials or personal property, such as furniture, floor, wall, or ceiling coverings; and that are safely accessible. (Refer to E2018.)

3.2.33 *readily available, adj*—information or records that are easily and promptly provided by a source to the individual making a request through an appropriate inquiry and without the need to research archive files.

3.2.34 *reasonable time and cost, adj*—information that is obtainable within *reasonable time and cost* constraints means that the information will be provided by the source (such as a request made to a building owner or local utility company serving the building) within 20 calendar days of receiving a written, telephone, or in-person request at no more than a nominal cost intended to cover the source’s cost of retrieving and duplicating the information, and providing it to the individual requesting it.

3.2.35 *reasonably ascertainable, adj*—information that is *readily available*, *practically reviewable*, and available in a reasonable time at a reasonable cost for retrieval, reproduction, or forwarding.

3.2.36 *renewable energy, n*—means a source of energy that occurs naturally or is regenerated naturally, including, without limitation such sources as: geothermal energy, solar energy, waterpower (hydro) and wind.

3.2.37 *repositioning, n*—changing a building’s use, for example, from office to retail, or from industrial to multifamily. For dated and inefficient commercial properties, building *repositioning* may be a more cost-effective and energy-saving modernization strategy than demolition and new construction.

3.2.38 *Savings-to-Investment Ratio (SIR), n*—ratio that equals expected lifecycle energy cost savings (discounted to

present value using an appropriate discount rate) divided by the initial investment made to achieve these savings. A *SIR* greater than one means that projected present value lifecycle energy cost savings from the installed measures exceeds the total investment, inclusive of any financing costs.

3.2.39 *Screening Assessment (SA), n*—the process described in Section 10. The *SA* may be performed independently, for example, in the property acquisition due diligence process, or as an initial screen to an *MCA* that may be performed for the owner of a property.

3.2.40 *secondary energy, n*—energy product (heat or electricity) created from a raw fuel, such as electricity purchased from the grid or energy (heat or cooling) received from a district system.

3.2.41 *site energy consumption, n*—amount of heat and electricity consumed by a building as reflected in its utility/energy bills. *Site energy consumption* may also be referred to as whole building *energy consumption*. Site energy may be delivered to a building in one of two forms: *primary energy* or *secondary energy* or both. *Energy consumption* and the methodology developed in *BEPIE* are based upon *site energy consumption*.

3.2.42 *source energy consumption, n*—*source energy consumption* represents the total amount of raw fuel that is required to operate a building and incorporates transmission, delivery, and production losses at/from the source. *Source energy consumption* is different from *site energy consumption*. While *source energy consumption* is not used in the methodology associated with a *BEPIE*, it is used by U.S. EPA to determine a building's greenhouse gas (carbon) emissions.

3.2.43 *Technical Resource Manual (TRM), n*—utility *Technical Resource Manuals* typically provide a standardized, fair and transparent approach in the *geographic* area where the utility operates for estimating energy savings in energy efficiency improvement programs. The *TRM* provides standardized energy savings calculations and assumptions at the measure level, for example, individual *EEM*, for estimating energy and demand savings. (Refer to **Appendix X9**.)

3.2.44 *under-performing, adj*—a building's weather-normalized *EUI* is considered *under-performing* when it is greater than the adjusted weather-normalized (*EUI-a*) of *peer* buildings used in the benchmarking process.

3.2.45 *user, n*—party seeking to use this guide to complete a *BEPIE*. A *user* may include, without limitation, a potential purchaser of the property, a potential tenant of the property, an owner of the property, a lender or a property manager.

3.2.46 *variability allowance, n*—a 10 % adjustment to the median (50th percentile) weather-normalized *EUI* of *peer* buildings to account for potential *EUI* variability that might exist due to possible building differences in the same building use (or type) category that may impact the *EUI* (refer also to **3.2.2**).

3.2.47 *WaterSense™, adj*—products with the *WaterSense™* label meet EPA's specifications for water efficiency and performance, and are backed by independent, third-party certification. Certifying organizations help maintain the *Wa-*

terSense™ label's integrity and credibility by verifying and testing products for conformance to *WaterSense™* specifications, efficiency, and performance.

3.3 *Acronyms and Abbreviations:*

- 3.3.1 *ASHRAE*—American Society of Heating, Refrigerating and Air-Conditioning Engineers
- 3.3.2 *ASTM*—ASTM International
- 3.3.3 *BEPIE*—Building Energy Performance and Improvement Evaluation
- 3.3.4 *BPD*—U.S. DOE Building Performance Database
- 3.3.5 *BTU*—British thermal units
- 3.3.6 *CBECS*—U.S. DOE Commercial Building Energy Consumption Survey
- 3.3.7 *CDD*—cooling degree days
- 3.3.8 *cf*—cubic feet
- 3.3.9 *DHW*—domestic hot water
- 3.3.10 *DOE*—U.S. Department of Energy
- 3.3.11 *EEM*—energy efficiency measure
- 3.3.12 *EER*—energy efficiency ratio (for example, efficiency rating for air conditioning equipment)
- 3.3.13 *EPA*—U.S. Environmental Protection Agency
- 3.3.14 *EUI*—energy use intensity (typically in units of kBtu/SF-yr)
- 3.3.15 *EUI-a*—adjusted *EUI* to reflect the *variability allowance*
- 3.3.16 *EUL*—estimated useful life
- 3.3.17 *GBI*—Green Building Initiative
- 3.3.18 *GFA*—building gross floor area in SF
- 3.3.19 *GRA*—building gross rentable (or leasable) area in SF
- 3.3.20 *HDD*—heating degree days
- 3.3.21 *HVAC*—heating, ventilation, and air conditioning
- 3.3.22 *IRR*—internal rate of return
- 3.3.23 *k*—kilo (10³)
- 3.3.24 *kcf*—thousand cubic feet
- 3.3.25 *kW*—kilowatt (10³ Watt)
- 3.3.26 *kWh*—kilowatt-hour
- 3.3.27 *LED*—light emitting diode
- 3.3.28 *LEED*—Leadership in Energy and Environmental Design
- 3.3.29 *MCA*—more comprehensive assessment (refer to *BEPIE* process)
- 3.3.30 *MM*—million (10⁶)
- 3.3.31 *NOAA*—National Oceanic and Atmospheric Administration
- 3.3.32 *NOI*—net operating income
- 3.3.33 *NPV*—net present value
- 3.3.34 *PCA*—property condition assessment
- 3.3.35 *PV*—photovoltaic

3.3.36 *RECS*—U.S. DOE Residential Energy Consumption Survey

3.3.37 *ROI*—return on investment

3.3.38 *SA*—screening assessment (refer to *BEPIE* process)

3.3.39 *SF*—square feet

3.3.40 *SIR*—savings-to-investment ratio

3.3.41 *WUI*—water use intensity, gal/SF

3.3.42 *yr*—year

4. Significance and Use

4.1 *Uses*—This guide is intended for use on a voluntary basis by parties who wish to conduct a *BEPIE*. The process defined in this guide involves: (1) the collection of building and equipment information, including whole building *energy consumption*, much of which is typically collected as part of an **E2018 PCA**; (2) weather-normalizing the whole building *energy consumption* to obtain an *EUI*; (3) benchmarking the *EUI* to compare against the *EUI* of *peer* buildings; and (4) determining if the building’s *EUI* is *under-performing* compared to the *EUI* of *peer* buildings. If the building’s *EUI* is *under-performing*, the guide (1) evaluates the extent to which the building is *under-performing*; (2) provides guidance on what energy efficiency improvements might be made to bring the building to the performance level of its *peers*; and (3) provides guidance to obtain a probable cost for these energy efficiency improvements. The guide is intended principally as an approach to conducting a standardized building *energy performance* inquiry in connection with *commercial real estate* involved in a *commercial real estate transaction* with the intent to identify a condition of *EUI* under-performance compared to *peer* buildings. The guide provides for two approaches: a *Screening Assessment (SA)* that may be conducted, for example, as an adjunct to an **E2018 PCA** during due diligence prior to an acquisition, and a *More Comprehensive Assessment (MCA)* that would include more rigorous investigation as may, for example, be conducted by a building owner seeking to make an investment in *EEMs*. This guide is intended to reflect a commercially practical and reasonable inquiry.

4.2 Clarifications on Use:

4.2.1 *Use in Conjunction with an E2018 PCA*—This guide, when added as a supplemental scope of work to an **E2018 PCA**, is designed to assist the *user* and *Consultant* in developing information about *energy consumption* and energy efficiency improvements that may be undertaken to reduce *energy consumption* in a building involved in a *commercial real estate transaction*. The guide also has utility to a wide range of situations, including those that may not involve a *commercial real estate transaction*. The guide is not intended to replace an **E2018 PCA**, but rather to supplement it.

4.2.2 *Independent Use*—This guide may also be used independently of any other building or property condition assessment.

4.2.3 *Site-Specific*—This guide is site and property-specific in that it relates to an existing building’s or property’s energy performance.

4.3 *Who May Conduct*—A *BEPIE* should be performed by a qualified *Consultant* or individual (hereafter referred to as the “*Consultant*”) with the education, training and experience necessary to perform the requirements of this guide (refer to 8.6). No practical approach can be designed to eliminate the role of professional judgment and the value and need for experience in the individual performing the inquiry. The professional experience of the *Consultant* is, consequently, important to the performance of a *BEPIE*.

4.4 *Additional Services*—Additional services not included within the scope of this guide may be contracted for between the *user* and the *Consultant* (refer to 13.1 – 13.2). For example, the *user* or *Consultant* may also wish to apply for *LEED®* or *ENERGY STAR®* certification.

4.5 *Principles*—The following principles are an integral part of this guide and are intended to be referred to in resolving any ambiguity or exercising such discretion as is accorded the *user* or *Consultant* in performing a *BEPIE*.

4.5.1 *Uncertainty is not eliminated*—No *BEPIE* standard can wholly eliminate uncertainty in determining the myriad of variables that can impact the *energy consumption* of a building on a property and the energy savings that might be realized by making energy efficiency improvements. The *BEPIE* is intended to reduce, but not eliminate, uncertainty regarding the impact of such variables.

4.5.2 *Assessment is not exhaustive*—This guide is not meant to be an exhaustive assessment. There is a point at which the cost of the information obtained or the time required to gather it outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of a *commercial real estate transaction*. One of the purposes of this guide is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing a *BEPIE* and the reduction of uncertainty about unknown conditions resulting from collecting additional information.

4.5.3 *Level of inquiry is variable*—Not every building will warrant the same level of assessment. The appropriate level of assessment should be guided by the type and complexity of the property being evaluated, the needs of the *user*, and the information already available or developed in the course of the inquiry.

4.6 *Rules of Engagement*—The contractual and legal obligations between a *Consultant* and a *user* (and other parties, if any) are outside the scope of this guide. No specific legal relationship between the *Consultant* and *user* was considered during the preparation of this guide.

5. Relationship to ASTM Standard E2018, ASTM E2797 and ASHRAE 211

5.1 *ASTM Standard E2018 PCA* is directed principally at the physical status of a building and associated property, including the building’s structure, electrical and mechanical systems, HVAC, roofing and plumbing systems, code compliance, parking lot, and sidewalk physical condition, with the objective of identifying deficiencies and the associated probable cost to remedy these deficiencies. This guide may be used to supplement an **E2018 PCA** when a *user* requests that

building *energy performance* compared to *peer* buildings be included in the *PCA*, and if *under-performing*, requests what energy efficiency improvement measures might be taken to reduce *energy consumption* and provide a probable cost of such measures. Section 7 summarizes the major activities in an **E2018 PCA** and what additional information would be needed to perform a *BEPIE*.

5.1.1 *BEPIE*—This guide is intended to be used independently or as a supplement to an **E2018 PCA**.

5.1.1.1 The *BEPIE* may be conducted concurrently with an **E2018 PCA**.

5.1.1.2 The *BEPIE* may be conducted independently of an **E2018 PCA**. When conducting a *BEPIE* independent of an **E2018 PCA**, certain data collection requirements associated with an **E2018 PCA** would still need to be collected for the *BEPIE* (refer to 7.1).

5.2 *ASTM Standard E2797, Building Energy Performance Assessment Standard* is directed at collecting whole building *energy consumption* data to ensure that building *energy consumption* is representative, particularly when *energy consumption* data is to be submitted to meet the requirements of energy disclosure legislation (refer to **Appendix X1**) or when used in benchmarking analysis.

5.2.1 For building *energy consumption* data to be representative, **E2797** establishes the following minimum requirements:

5.2.1.1 Building *energy consumption* data should be collected preferably over the previous three years, with a minimum of one year, or back to the last *major renovation* if completed less than three years prior. If only the previous year's data is collected, no *major renovation* should have been completed in that time. A *major renovation* is defined as a building renovation that either involves expansion (or reduction) of the building's *GFA* by 10 % or more or impacts whole building *energy consumption* by more than 10 %.

5.2.1.2 Building *energy consumption* data excludes any *energy consumption* associated with parking areas.

5.2.1.3 *EUI* data is based upon a building's *GFA*, rather than rentable or leasable floor area (*GRA*).

5.2.1.4 Actual building *EUI* should be *normalized*, at the minimum weather-*normalized*. Depending upon site-specific circumstances, a building's energy use may also be *normalized* based upon other conditions occurring in the assessment time period such as an unusual vacancy or material change in hours of operation.

5.2.1.5 Historical weather data, including monthly *HDD* and *CDD* data applicable to the location of a property should be obtained for a minimum 10-year period to determine typical weather.

5.2.1.6 Weather-normalization should be performed using *HDD* and *CDD* data from the nearest location having weather data.

5.2.2 *BEPIE*—**E2797** is referenced in this guide to establish consistent data collection requirements to ensure that building *energy consumption* is representative for benchmarking purposes.

5.3 *ASHRAE 211, Standard for Commercial Building Energy Audits*—This standard defines the scope of work associated with the conduct of a Level 1, 2 or 3 energy audit.

5.3.1 *BEPIE*—*ASHRAE 211* is referenced in this standard to identify what may be involved in conducting an *MCA*.

6. User Responsibilities

6.1 *Scope*—The purpose of this section is to describe tasks to be performed by the *user* that will assist the *Consultant* conducting the *BEPIE* on a building connected to a *commercial real estate transaction*. These tasks do not require the technical expertise of a *Consultant* and are generally not performed by the *Consultants* performing a *PCA*, unless directed to do so by the *user*. In a *commercial real estate transaction*, it is common for the *user* to be the prospective property purchaser (the buyer), with the *Consultant* working for this *user*. Notwithstanding, the relevant information about the building is best obtained from the property owner (for example, the seller), or operator, and/or key site manager. As such, it is not unusual to find the *user* requesting information directly from the seller, with the understanding that such person is under no legal obligation to provide the information. It is also not unusual to find the *user* requesting the *Consultant* to obtain the information needed directly from the seller (that is, as part of the *PCA*). If the property owner is unwilling or unable to provide building *energy consumption* information, a *BEPIE* cannot be performed.

6.2 *Specialized Knowledge or Experience of the User*—If the *user* has any specialized knowledge or experience that may be material to the *BEPIE* (such as a recent energy audit that may have been conducted), it is the *user's* responsibility to communicate any information based on such specialized knowledge or experience to the *Consultant* before the *Consultant* conducts the *BEPIE*.

6.3 *Non-responsiveness*—If the *user* is unable to obtain the information requested directly from the property owner (or seller in a *commercial real estate transaction*) or a designated representative, the *user* should request authorization from the property owner for the *Consultant* to collect the information, if available, through an interview process with the property manager, operator, and/or the key site manager, and/or through a request to the responsible utility or energy provider or both. If the property owner is unwilling to provide building *energy consumption* information and it is not possible for the *Consultant* to otherwise develop a representative estimate of building *energy consumption*, the *BEPIE* cannot be performed.

6.4 *Other*—Either the *user* should make known to the *Consultant* the reason why the *user* wants to have the *BEPIE* performed (such as, for example, to meet a regulatory (see **Appendix X1**) or a financing or a due diligence requirement) or, if the *user* does not identify the purpose of the *BEPIE*, the *Consultant* should assume the purpose is to conduct a *building energy performance and improvement evaluation* for the *user*. The *user* and the *Consultant* may also need to modify the scope of services performed under this guide for special circumstances, including, but not limited to, unique local or site-specific conditions (refer to 13.1 – 13.2).

6.5 *Non-existent Legal Obligation*—Nothing in this guide is intended to create or imply the existence of a legal obligation for reporting of building energy performance or other building-related information. Any consideration of whether such an obligation exists under any federal, state, local or common law is beyond the scope of this guide.

7. BEPIE Data Requirements

7.1 *Data Collected in an E2018 PCA*—The major items extracted from an **E2018 PCA** that would be collected for the building and used in the *BEPIE* are identified below. If the *BEPIE* is not being conducted in conjunction with a *PCA*, this information, if available, needs to be collected to perform the *BEPIE*.

- 7.1.1 Building general description
 - 7.1.1.1 Building name and address
 - 7.1.1.2 Use (office, strip shopping center, restaurant, hotel, multifamily, mixed use, etc.)
 - 7.1.1.3 Description (building envelope, interior, exterior, etc.)
 - 7.1.1.4 Building *GFA* (and SF of each major use in mixed use buildings)
 - 7.1.1.5 Building *GRA* (gross rentable area)
 - 7.1.1.6 Common area description (including SF)
 - 7.1.1.7 Description of HVAC systems
 - 7.1.1.8 Year of Construction
 - 7.1.1.9 Month and year of last *major renovation* completed, with description
 - 7.1.1.10 Tenant(s) general description
 - 7.1.1.11 Parking lot description (open, closed, partially closed, separate, integral to the building)
 - 7.1.1.12 Vacancy status
 - 7.1.2 Walk-through Survey
 - 7.1.2.1 Mechanical systems (HVAC, hot water heating, plumbing, etc.)
 - 7.1.2.2 Special utility systems (solar, combined heat and power, etc.)
 - 7.1.2.3 Age and condition of systems (*estimated useful life/remaining useful life*)
 - 7.1.2.4 Level of maintenance associated with systems
 - 7.1.2.5 Recent replacement/upgrades of systems
 - 7.1.2.6 Electrical service (meters, lighting systems, energy management systems, etc.)
 - 7.1.3 Documents on Mechanical/Electrical Systems, if available
 - 7.1.3.1 Warranty information
 - 7.1.3.2 Purchase records
 - 7.1.3.3 Costs for recent improvement/replacements
 - 7.1.3.4 Planned improvements/replacements
 - 7.1.3.5 As-built drawings and specifications
 - 7.1.4 Interviews
 - 7.1.4.1 Historical repairs/major equipment replacements and costs
 - 7.1.4.2 Recent *major renovations*
 - 7.1.4.3 Planned improvements
 - 7.1.4.4 Equipment maintenance policy and experience

7.2 *Data Collected in a PCA Complying With Fannie Mae Multifamily Protocol*—Fannie Mae’s Multifamily *PCA* Proto-

col includes data collection requirements similar to **E2018** (refer to 7.1). However, there are additional data collection requirements pertinent to implementation of a *BEPIE* for multifamily property, including:

- 7.2.1 Water Usage
 - 7.2.1.1 Property annual (previous 12 months) water consumption (for High Performance Building Assessment)
 - 7.2.1.2 Identification of low-flow devices, including toilets, showerheads, faucets or faucet Aerators. (Refer to **Appendix X10**.)
 - 7.2.1.3 Identification of *ENERGY STAR*® and/or *WaterSense*™-certified fixtures and appliances. (Refer to **Appendix X10**.)
- 7.2.2 Regulatory Compliance
 - 7.2.2.1 Energy Performance Metrics – for a property subject to federal, state, or local energy and/or water consumption reporting requirements, identify the *ENERGY STAR*® Score, EPA Water Score and Water Use Intensity for the property as generated by EPA Portfolio Manager®. (Refer to **Appendix X3**.)
 - 7.2.2.2 Energy Retro-Commissioning – if applicable, identify compliance with federal, state, or local retro-commissioning, energy audit or other energy benchmarking requirements. (Refer to **Appendix X1**.)

7.3 *Additional Data Requirements*—The following additional data (in addition to what is collected in the **E2018 PCA** and/or Fannie Mae Multifamily *PCA* Protocol) needs to be collected to conduct the *BEPIE*:

- 7.3.1 Building general description:
 - 7.3.1.1 The number of electric meters associated with the building (refer to utility bills).
 - 7.3.1.2 If the building has a parking area with lighting and or ventilation, identify if electricity consumption is included or excluded from whole building electricity consumption.
 - 7.3.1.3 General description of interior and exterior lighting and controls (such as use of occupancy sensors).
 - 7.3.1.4 General description of windows and approximate SF.
- 7.3.2 Walk-through Survey
 - 7.3.2.1 Information on energy-consuming equipment tags (if *easily visible* and *readily accessible*) such as make, model, etc.
 - (1) Space cooling equipment
 - (2) Space heating equipment
 - (3) DHW heating equipment
 - (4) Ventilation equipment
 - (5) Other (for example, refrigeration, etc.)
 - 7.3.2.2 General lighting description
 - 7.3.3 Document review
 - 7.3.3.1 Whole building historical electricity (generation and demand) and fuel use (consumption and demand, if applicable), preferably from utility invoices. If utility invoice availability is incomplete, *Consultant* may use professional judgment to develop a reasonable estimate of whole building *energy consumption*.
 - (1) Utility invoices (and timeframe) associated with all electric meters serving the building (but excluding any electric meters solely associated with parking) for the past three years,

if available, or back to the last *major renovation* if completed less than three years prior, or at the minimum, for the most recent thirteen months (to obtain a full year of data). If the last *major renovation* was completed within the most recent full twelve months, review utility invoices back to when the last *major renovation* was completed (this information may be useful to facilitate an estimation of annual whole building electricity consumption).

(2) Fuel consumption/timeframe (natural gas, oil, propane, district) associated with the building for the past three years, if available, or back to the last *major renovation* if completed less than three years prior, or at the minimum, for the most recent twelve months (or thirteen months if needed to obtain a full year of data). If the last *major renovation* was completed within the most recent year, review utility invoices back to when the last *major renovation* was completed (this information may be useful to facilitate an estimation of annual whole building fuel consumption).

7.3.3.2 The most current electric utility bill indicating both generation (kWh) and demand (kW) cost.

7.3.3.3 The most current fuel bill indicating consumption and demand cost.

7.3.3.4 For multifamily property, water usage for the most recent complete twelve month period during which there was no major operational change that would have materially impacted water usage at the property.

(1) Identify water cost from the most current water bill.

7.3.3.5 Energy audit reports, if available.

7.3.3.6 Building energy certification(s) (for example, LEED®, ENERGY STAR®, Green Globes®, etc.), if available.

7.3.3.7 Government energy benchmarking documentation, if the building is located in a municipality with building energy disclosure legislation and requirements.

7.3.4 Interviews

7.3.4.1 Extent to which the vacancy rate may have been unusual during the time period in which building *energy consumption* data was collected.

7.3.4.2 Extent to which the building operating hours may have been unusual during the time period in which building *energy consumption* data was collected.

7.3.4.3 Energy efficiency improvements, if any, made in the last 5 years.

7.3.4.4 Maintenance experience on existing HVAC equipment, for example, contractual or non-contractual maintenance, extent to which preventive maintenance is performed, if maintenance is only performed when problems are encountered, etc.

8. Building Energy Performance and Improvement Evaluation (BEPIE) Process

8.1 *Objective*—The purpose of the *BEPIE* process described in this guide is to conduct, to the extent feasible pursuant to the processes prescribed herein, a *building energy performance and improvement evaluation*. A *BEPIE* includes: (1) collection of historical building *energy performance* and *EUI*; (2) *normalizing* building *energy performance* and *EUI*; (3) benchmarking building *normalized EUI* by comparing it with the median *normalized EUI* of *peer* buildings in the same *geo-*

graphic area or *climate zone*; (4) if the building is *underperforming* against *peer* building *EUI*, identifying the *energy consumption* reduction needed to achieve parity with *peer* buildings; (5) identifying energy efficiency improvements that might be made to achieve this reduction in *energy consumption* and provide a probable cost of these improvements; and (6) submitting findings and conclusions to the *user* or other *user-designated* parties. For multifamily properties, the *BEPIE* process also includes a water usage assessment and what might be undertaken to reduce water usage. The *BEPIE* process described in this guide is intended to be used independently, or to supplement but not replace, an existing **E2018 PCA**.

8.2 *Process*—The process to accomplish the objective consists of two alternative approaches. The first approach is the *Screening Assessment (SA)* designed to provide an indication of potential energy efficiency improvements that might be made to buildings consuming more energy, that is, having a greater *EUI*, than *peer* buildings and the probable cost of these improvements. It may be conducted in the due diligence process, typically as an adjunct to an **E2018 PCA** conducted prior to a property being acquired. For multifamily property, a water usage assessment would also be included. The second approach is the *More Comprehensive Assessment (MCA)* as might, for example, be conducted post-closing for a new building owner (who might previously have been the prospective purchaser of the building where the *SA* was performed). The *MCA*, such as an ASHRAE Level 2 or ASHRAE Level 3 energy audit, provides greater certainty around the selected energy saving improvements, the projected *energy consumption* savings, and the probable cost of these measures. Assuming the *energy consumption* and cost savings identified in the *SA* are attractive, this may provide justification for the new building owner, that is, former prospective purchaser, to authorize an *MCA* in support of an energy efficiency improvement project at the newly acquired property. Notwithstanding, the process is designed to incorporate flexibility to enable *users* to determine whether the *SA* or *MCA* approach best aligns with their needs.

8.3 *Applicability*—The *MCA* process is applicable to all property uses where energy is being consumed; however, applicability of the *SA* process has certain limitations. The *SA* process is not applicable in the following cases:

8.3.1 Building *energy consumption* data is not available to establish a representative *energy consumption* baseline, nor is it possible to develop a reasonable estimate of baseline building *energy consumption*. Such situations may be encountered, for example, in the following scenarios:

8.3.1.1 Newly constructed buildings (where historical *energy consumption* data does not exist).

8.3.1.2 Buildings undergoing *repositioning*, that is, changing use (where historical *energy consumption* data does not exist for the intended new use of the building).

8.3.1.3 Vacant buildings or buildings with significant vacancy (where existing building *energy consumption* does not provide a representative baseline and where it is not possible to obtain a reasonable estimate to establish a representative baseline).

8.3.1.4 Buildings that have completed a *major renovation* within the previous 12 months (such as the addition of a data center or significant floor space expansion) and where it is not possible to obtain a reasonable estimate to establish a representative baseline post-renovation.

8.3.1.5 Buildings where owners/tenants responsible for paying utility costs cannot or are otherwise unable to provide *energy consumption* data, and where it is not possible to develop a reasonable estimate to establish a representative baseline.

8.3.1.6 Industrial/manufacturing facilities (where *energy consumption* is typically process- and operation-specific), other than buildings used for warehousing and storage.

8.3.2 Buildings that have an active certification indicated that *energy performance* exceeds that of *peers*, for example, *ENERGY STAR® certification*. An active certificate is one that is current and up-to-date. For example, a building's *ENERGY STAR® certification* must be re-certified every year by a third-party. If it has not been re-certified within the previous 12 months, the *ENERGY STAR® certification* is no longer active and valid. (Refer to [Appendix X11](#).)

8.3.3 Insufficient number of *peer* buildings exists to conduct representative benchmarking.

8.3.4 Building type is not a traditional commercial or multifamily use (refer also to [Appendix X2](#)).

8.3.5 Buildings that are served by district heat or chilled water may present certain limitations in identifying potential energy efficiency improvements to reduce *energy consumption* in the *SA* process. For example, if district steam is used at the building, potential use of an on-site high efficiency boiler or DHW heating system may be eliminated from *EEM* consideration. However, other *EEMs*, such as LED lighting, high efficiency air conditioning, etc., can still be considered to reduce building *energy consumption* if needed to achieve parity with *peers*. If district chilled water is used at the building, potential use of an on-site high efficiency chiller system may be eliminated from potential *EEM* consideration. However, other *EEMs*, such as LED lighting, high efficiency boilers, etc., can still be considered to reduce building *energy consumption* if needed to achieve parity with *peers*. If energy may be saved by switching from district heating or cooling to on-site heating or cooling, such assessment would best be served by conducting the *MCA* process.

8.3.6 Buildings that have a combined heat and power (CHP) system or solar PV system or other *renewable energy* system where building owners have already invested in equipment to improve performance by producing electricity on-site.

8.4 *Steps in Conducting a BEPIE*—The *BEPIE* process can supplement the *E2018 PCA* process by including the collection of additional information (refer to [7.3](#)) during the *PCA* site walk-through survey, interviews and document review.

8.4.1 *Site visit*—The objective of the expanded site visit to conduct the *BEPIE* is to: (1) interview persons at the building who are knowledgeable about building operating characteristics and *energy consumption*; (2) more closely observe major building systems that can impact *energy consumption*; (3) and collect available utility and other records, if not previously provided, including, if *readily available*, operation and main-

tenance data, from either building personnel or the utility/energy service provider servicing the property.

NOTE 1—The user may find that the annual *energy consumption* of the building has been collected under existing local or state codes or statutes (refer to [Appendix X1](#)). Such data may be useful in meeting the objectives of this section.

8.4.1.1 *Identification of Key Site Manager before the site visit*—The *user* should identify for the *Consultant* the key site manager or a knowledgeable representative at the property before the site visit.

8.4.1.2 *Interviewing the Key Site Manager*—The key site manager or a knowledgeable representative should be interviewed during the site visit and accompany, if possible, the *Consultant* on the building walk-through.

8.4.1.3 *Observation during the Building Walk-Through*—Major building and site components that can impact *energy consumption* should be visually observed.

8.4.1.4 *Frequency*—It is not expected that more than one visit to the property should be made in connection with a *BEPIE*. This visit may be conducted in conjunction with the walk-through survey conducted for the *E2018 PCA*, with the duration on-site depending, among other things, on property size and complexity. If an *SA* is being conducted, the individual(s) visiting the site to collect the data needed for the *E2018 PCA* can also collect the additional field information needed to complete the *BEPIE*.

8.4.2 *Interviewing Knowledgeable Personnel*—The objective of the expanded interview process to conduct the *BEPIE* is to: (1) interview persons at the building who are knowledgeable about building *energy consumption*; and (2) collect available utility and other records, if available and not previously provided, that will assist in analysis of building *energy performance*. The goal of the questioning during the interview should be to: (1) collect *BEPIE* supporting information if not previously provided; (2) fill in any *data gaps* that may exist in the information received; (3) confirm building operating characteristics; and (4) verify major building *energy consumption* systems.

8.4.3 *Collecting Building Records*—The purpose of records collection is to obtain and compile utility and other such records, if available, that will help identify: (1) historical building *energy consumption*; (2) other building *energy consumption* records that might be available; and (3) other pertinent building reports.

8.4.3.1 *Prior to the site visit*—*Consultant* should contact the *user* or, if authorized by the *user*, the building owner, operator, or key site manager, or other third parties such as the local utility or utility bill payment service provider, and request specific records either to be forwarded before the site visit or be available for review during the site visit.

8.4.3.2 *During the site visit*—*Consultant* should collect the following record information or confirm that such record information collected prior to the site visit is complete.

(1) Most recent utility bill to identify supplier, rate code for billing and energy (electricity and fuel) costs. For multifamily property, include the most recent water bill to identify cost.

(2) Building *energy consumption* and water usage records.

(3) Other pertinent building records or reports such as may be available, including, but not limited to energy audit reports, operation and maintenance records, as-built drawings, major energy-consuming equipment purchase information, and building energy certification reports (refer to [Appendix X11](#)).

8.4.3.3 *Reasonably Ascertainable*—Availability of record information varies among information sources, including governmental and utility sources. The *user* or *Consultant* is not obligated to identify, obtain, or review every possible record that might exist with respect to a building. Instead, the *user* or *Consultant* is required to review only record information that is *reasonably ascertainable*. Record information that is *reasonably ascertainable* means: (1) information that is *readily available*; (2) information that is *practically reviewable*; and (3) information that is obtainable from its source within *reasonable time and cost* constraints.

(1) *Readily Available*—Information or records that are easily and promptly provided by a source to the individual making a request through an appropriate inquiry and without the need to research archive files.

(2) *Practically Reviewable*—Information that is *practically reviewable* means that the information is provided by the source in a manner and in a form that, upon examination, yields information relevant to the building without the need for extraordinary analysis of irrelevant data.

(3) *Reasonable Time and Cost*—Information that is obtainable within reasonable time and available for reasonable cost means that the information will be provided by the source within 20 calendar days of receiving a written, telephone, or in-person request at no more than a nominal cost intended to cover the source’s cost of retrieving and duplicating the information. Information that can only be reviewed by a visit to the source is *reasonably ascertainable* if the visit is permitted by the source within 20 days of request.

8.4.3.4 *Accuracy and completeness*—Accuracy and completeness of record information varies among information sources, including governmental and utility sources. Record information may be inaccurate or incomplete. The *user* or *Consultant* is not obligated to identify mistakes or insufficiencies in the information provided. However, the *Consultant* reviewing records should make a reasonable effort to compensate for mistakes or insufficiencies in the information reviewed that are obvious considering the *Consultant’s* experience or other information of which the *Consultant* has *actual knowledge* or both.

8.4.4 *Findings and Conclusions Reporting*—A separate *BEPIE* report (refer to [Appendix X12](#)) should be prepared, unless the *BEPIE* is being performed as part of an **E2018 PCA** conducted on a property connected to a *commercial real estate transaction*, in which case the *BEPIE* findings and conclusions may be incorporated in the *PCA* report.

8.4.4.1 *Components*—Findings and conclusions should address the following:

(1) *Data Collected*—data collected from the document request to the Owner, during the building walk-through, and the interviews conducted.

(2) *Benchmarking*—the building’s *EUI* and how it compares to *peer* buildings.

(3) *Performance Evaluation*—directed at identifying if the building’s *EUI* is *under-performing* compared to *peers*.

(a) *Acceptable performance* is an *EUI* equal to or less than that of *peer* buildings.

(b) *Under-performance* is an *EUI* greater than that of *peer* buildings, that is, *EUI-a*, where *peer* building *EUI* includes the uncertainty allowance, that is, 10 %. As such, under-performance is a building *EUI* greater than 1.1 times the median *EUI* of *peer* buildings.

(4) *Improving Under-performing Buildings*

(a) *Improvements*—potential energy efficiency improvements that can reduce building *energy consumption* (and for multifamily properties, that can also reduce property water usage).

(b) *Probable Cost of Improvements*—a probable cost for the energy saving improvements (and for multifamily, also the probable cost for any water saving measures).

8.5 Coordination of Parts:

8.5.1 *Parts Used in Concert*—Data collected are intended to be used in concert with each other. If information from one source (for example, the records received) indicates the need for more information, other sources (for example, the interviews) may be available to provide this information.

8.5.2 *User’s Obligations*—The *Consultant* should note in the findings if the *user* has provided the *Consultant* with information pursuant to Section 6 of this guide.

8.6 *Consultant Qualifications*—The following general guidance addresses acceptable qualifications to perform the *BEPIE*. The qualifications of the *Consultant* conducting the *BEPIE* will depend upon whether a *Screening Assessment (SA)* or a *More Comprehensive Assessment (MCA)* is conducted. This guide also recognizes that appropriate qualification levels may vary for different building uses (or types), complexity and the scope of work required for building *energy performance* assessment.

8.6.1 *Screening Assessment (SA)*—The *SA* process is designed to provide a preliminary assessment of a building’s *energy performance* and how it compares to *peer* buildings in the same *geographic* area or *climate zone*. The *SA* should be performed by an individual(s) qualified to conduct the site walk-through, interviews, data collection, and analysis defined for an *SA* and having the ability to identify issues relevant to the conduct of a *BEPIE* in connection with a building involved in a *commercial real estate transaction*. Specifically, the individual conducting the walk-through survey in the *SA* process is a person who possesses the appropriate education, training, and experience necessary to conduct the survey and collect the pertinent data for the *BEPIE*. This may be the individual conducting the walk-through survey for an **E2018 PCA**. (Refer to the qualifications for individuals conducting various components of an **E2018 PCA** in [Appendix X1.1 of E2018](#).) The individual(s) responsible for reviewing the information collected and providing professional judgment to develop opinions and conclusions for the *BEPIE*, if different than the individual conducting the walk-through survey, should also have appropriate education, training and experience. It is recognized that the quality of the *BEPIE* is highly dependent on the qualifications of those collecting and reviewing the data