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## Standard Practice for Building Energy Performance Assessment for a Building Involved in a Real Estate Transaction<sup>1</sup>

This standard is issued under the fixed designation E2797; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 *Purpose*—The purpose of this standard is to define a commercially useful practice in the United States of America for conducting a *building energy performance assessment (BEPA)* on a building involved in a *commercial real estate transaction* and subsequent reporting of the *building energy performance* information. The practice is intended to provide a methodology to the *user* for the collection, compilation, analysis, and reporting of *building energy performance* information associated with a commercial building. The practice may be used independently or as a voluntary supplement to Guide E2018 for *property condition assessments* or Practice E1527 for Phase I *environmental site assessments*. Utilization of this practice and performance of a *BEPA* is voluntary. If the *property owner* (e.g., ~~for example,~~ the seller) is unwilling or unable to provide *building energy use/consumption* and cost information, a *BEPA* cannot be performed.

1.2 *Building Energy Performance*—This practice defines *building energy performance* as the building's total annual *energy use/consumption* and cost for heating, cooling, electricity, and other related uses. *Energy use/consumption*, for example, includes total electricity purchased; purchased or delivered steam, hot water, or chilled water; natural gas; fuel oil; coal; propane; biomass; or any other matter consumed as fuel and any electricity generated on site from *renewable/alternative* energy systems (for example, wind energy generator technology, fuel cells, microturbines or solar photovoltaic systems).

1.3 *Objectives*—Objectives in the development of this practice are to: (1) define a commercially useful practice for collecting, compiling, and analyzing *building energy performance* information associated with a building involved in a *commercial real estate transaction*; (2) facilitate consistency in the collection, compilation, analysis, and reporting of *building energy performance* information as may be required under building benchmarking, labeling, disclosure, or mandatory auditing regulations; (3) supplement as needed a *property condition assessment* conducted in accordance with Guide E2018 or an *environmental site assessment* conducted in accordance with Practice E1527; (4) provide that the process for *building energy performance* data collection, compilation, analysis, and reporting is consistent, transparent, practical and reasonable; and (5) provide an industry standard for the conduct of a *BEPA* on a building involved in a *commercial real estate transaction*, subject to existing statutes and regulations which may differ in terms of scope and practice.

1.4 *Documentation*—The scope of this practice includes data collection, compilation and reporting requirements. Documentation of all sources, records, and resources relied upon in the investigation is provided in the *report*.

1.5 *Considerations Outside the Scope*—The use of this practice is limited to the collection, compilation, and analysis of *building energy performance* information as defined by this ~~practice.~~ practice for real estate transactions in the United States of America.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.02 on Real Estate Assessment and Management.

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While this information may be used to facilitate building benchmarking, labeling, rating or ranking, reporting of *building energy performance* information between a seller and a buyer or a landlord and a tenant on a voluntary basis or as may be required by building benchmarking, labeling, disclosure or mandatory auditing regulations applicable to the building, or any other use, such use is beyond the scope of this practice. This ASTM Standard Practice does not supersede existing statutes and regulations.

1.6 *Organization of This Practice*—This practice has 13 sections and 11 appendices. The appendices are included for informational purposes only and are not part of the procedures prescribed in this practice.

Section 1	Describes the scope of the practice.
Section 2	Identifies referenced documents.
Section 3	Provides terminology pertinent to the practice.
Section 4	Discusses the significance and use of the practice.
Section 5	Discusses the relationship between this practice and ASTM Guide E2018 or ASTM Practice E1527.
Section 6	Describes the <i>user's</i> responsibilities under this practice.
Section 7	Describes the <i>BEPA</i> process.
Section 8	Describes the <i>site visit</i> and <i>walk-through</i> .
Section 9	Discusses <i>interviews</i> with <i>owner, operator, or key site manager</i> .
Section 10	Describes records collection for the <i>BEPA</i> process.
<del>Section 11</del>	<del>Provides the records analysis methodology for building energy use data.</del>
<u>Section 11</u>	<u>Provides the records analysis methodology for building energy consumption data.</u>
<del>Section 12</del>	<del>Focuses on <i>BEPA report</i> preparation and reporting of building energy use information.</del>
<u>Section 12</u>	<u>Focuses on <i>BEPA report</i> preparation and reporting of building energy consumption information.</u>
Section 13	Identifies non-scope considerations.
<del>Appendix X1</del>	<del>Provides the legal background on federal, state, or local building energy use disclosure legislation and regulation.</del>
<u>Appendix X1</u>	<u>Provides the legal background on federal, state, or local building energy consumption disclosure legislation and regulation.</u>
Appendix X2	Identifies <i>building energy performance</i> and sustainability labeling programs.
Appendix X3	Discusses government and utility energy efficiency incentives and grants.
Appendix X4	Provides guidance on suggested qualifications for the <i>consultant</i> conducting the <i>BEPA</i> .
Appendix X5	Information that can be collected from the property <i>owner/operator/key site manager</i> .
<del>Appendix X6</del>	<del>Provides a recommended table of contents and report format for the <i>BEPA</i>.</del>
<u>Appendix X6</u>	<u>Provides a recommended table of contents and report format for the <i>BEPA</i>.</u>
<del>Appendix X7</del>	<del>Provides general property types with categories and sub-categories that can impact building energy use.</del>
<u>Appendix X7</u>	<u>Provides general property types with categories and sub-categories that can impact building energy consumption.</u>
Appendix X8	Provides a general commercial building survey checklist.
<del>Appendix X9</del>	<del>Presents carbon emission estimation methodology associated with combustion processes related to energy use in a commercial building.</del>
<u>Appendix X9</u>	<u>Presents carbon emission estimation methodology associated with combustion processes related to energy consumption in a commercial building.</u>
Appendix X10	Provides common no-cost/low-cost energy saving measures for commercial buildings.
<del>Appendix X11</del>	<del>Provides illustrative example of building site energy use calculations.</del>
<u>Appendix X11</u>	<u>Provides illustrative example of building site energy consumption calculations.</u>

1.7 *Units*—The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.8 *This practice cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard practice 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 practice be applied without consideration of a building's many unique aspects. The word "standard" in the title means only that the practice has been approved through the ASTM consensus process.*

1.9 *Nothing in this practice is intended to create or imply the existence of a legal obligation for reporting of 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 practice.*

1.10 *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.*

1.11 *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:<sup>2</sup>

[E1527 Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process](#)

[E2018 Guide for Property Condition Assessments: Baseline Property Condition Assessment Process](#)

### 2.2 Other Standards:<sup>3</sup>

[ASHRAE, 2011, Procedures for Commercial Building Energy Audits Audits, Second Edition](#)

[ASHRAE, 2010, 2012, Performance Measurement Protocols for Commercial Buildings Buildings: Best Practices Guide](#)

[ASHRAE Building Energy Quotient, www.ashrae.org/buildingEQ](#)

[ASHRAE Standard 211-2018, Standard for Commercial Building Energy Audits](#)

[ANSI/ASHRAE Standard 105-2007/105-2014 Standard Methods Method of Measuring, Determining, Expressing and Comparing Building Energy Performance and Greenhouse Gas Emissions](#)

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

[ISO 52000-1:2017, Energy Performance of Buildings](#)

## 3. Terminology

3.1 *Definitions*—This section provides definitions and descriptions of terms used in this practice, terms used in this practice extracted from Practice [E1527](#) and Guide [E2018](#), and a list of acronyms for keywords used in this practice. The terms are an integral part of this practice and are critical to an understanding of the practice and its use.

### 3.2 Definitions of Terms Specific to This Standard: [ASTM E2797-22](#)

<https://standards.iteh.ai/catalog/standards/sist/78d149a6-db13-4fee-a25a-072991019c5/astm-e2797-22>

3.2.1 *appropriate reporting, n*—represents a standardized way to report *building energy performance* information collected in accordance with and under the specific conditions identified in this practice to parties including, but not limited to, prospective purchasers, *owners*, property managers, lenders, tenants, investors, or others, including government or regulatory entities, that may request such information.

3.2.2 *building energy performance, n*—a building's total annual *energy useconsumption* and cost for ~~heating, cooling, and electricity and~~ electricity and fuel used for heating, cooling and other energy-related uses.

3.2.3 *building energy performance assessment, BEPA, n*—the process as described in this practice by which a person or entity collects, analyzes and reports on the *energy useconsumption* and energy cost associated with a building. The output from the process is the *pro forma building energy useconsumption* and the *pro forma building energy cost*, which are considered representative for the building at the time the assessment is performed. Also provided is a reasonable range for building *energy useconsumption* and energy cost. Finally, the process provides the actual building *energy useconsumption* and cost over the time period included in the investigation. A *BEPA* is based upon data collected over the prior three years, or back to the last *major renovation* if completed less than three years ago, with one year minimum. If acceptable data is not available for the minimum of one year, a *BEPA* cannot be conducted as prescribed in this standard.

3.2.4 *commercial real estate, n*—improved real property, except a dwelling or property with four or less dwelling units exclusively

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

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 more than four residential dwelling units; and property with four or less dwelling units for residential use when it has a commercial function, as in the operation construction of such dwellings for profit. (Refer to Practice [E1527](#).)

3.2.5 *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. (Refer to Practice [E1527](#).)

3.2.6 *cooling degree-days (CDD), n*—for each day with an average temperature higher than  $65^{\circ}\text{F}$  ( $18.3^{\circ}\text{C}$ ),  $65^{\circ}\text{F}$  ( $18.3^{\circ}\text{C}$ ), *CDD* is the difference between the average temperature and  $65^{\circ}\text{F}$  ( $18.3^{\circ}\text{C}$ ),  $65^{\circ}\text{F}$  ( $18.3^{\circ}\text{C}$ ). For example, on a day with a mean temperature of  $80^{\circ}\text{F}$  ( $26.6^{\circ}\text{C}$ ),  $80^{\circ}\text{F}$  ( $26.6^{\circ}\text{C}$ ), 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>.

3.2.7 *data gap, n*—lack of or inability to obtain information required by this practice 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 required by this practice, including, but not limited to the collection of records data (for example, an inability to collect *energy use/consumption* data back three years, or to the last *major renovation* if it occurred less than three years ago, or a minimum of one year’s data), and *interviews* (for example, an inability to interview the key site manager, and so forth). (Refer to Practice [E1527](#).)

3.2.8 *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.

3.2.9 *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 Guide [E2018](#).)

3.2.10 *energy use/consumption, n*—total quantity of energy applied to a site, a facility, or a building for powering and sustaining all end-uses including energy generated by renewable sources. Such energy may include electricity, natural gas, heating oil, district steam, district hot water, district cooling water, propane, and so forth, used by a facility for heating, cooling, ventilation, lighting, or powering other end uses in a building, with energy generated by *renewable energy sources* such as solar, wind or fuel cells separately identified (as these may be netted out when determining building *energy use/consumption*). The units of total building *energy use/consumption* are typically in thousands thousand of Btu per year (kBtu/yr). *Energy use/consumption* as described in this practice refers to *site energy use/consumption*.

3.2.11 *energy use/consumption equation, n*—relates the dependent variable, a building’s total *site energy use/consumption*, including electricity and on-site fuel/district *energy use/consumption*, to independent variables whose variability is known to impact materially a building’s *energy use/consumption*. Independent variables may, for example, include weather conditions (*HDD* and *CDD*), operating hours for the building, *occupancy* (or *vacancy*) rate, and number of *occupants*. Independent variables may also include any other variables judged to have a material influence on building *energy use/consumption* and deemed by the *BEPA consultant* to be available, appropriate, and relevant for the analysis. The *energy use/consumption equation* for a building may be calculated for a building’s total *energy use/consumption*, for example, combined electricity and fuel, or separately for the building’s electricity use and for the building’s fuel use.

3.2.12 *energy use/consumption intensity (EUI);(ECI), n*—total building *energy use/consumption* divided by the building’s *gross floor area*. The units of building *energy use/consumption intensity* are typically kBtu/SF-yr. *EUI/ECI* is associated with a building of a specific property type with specific characteristics or other factors that may facilitate comparison with similar type buildings with similar characteristics (see [Appendix X7](#) for a sample checklist of building characteristics that can impact *energy use/consumption* associated with select building types). *EUI/ECI* as described in this practice is determined on a *site energy use/consumption* basis. *Energy consumption intensity* has also been referred to as *energy consumption intensity (EUI)*.

3.2.13 *environmental site assessment (ESA)*, *n*—process by which a person or entity observes a property, interviews knowledgeable *owners* or *operators* and state regulatory personnel, collects and reviews *reasonably ascertainable* government and historical property records for the purpose of identifying if a recognized environmental condition exists at the property. The *ESA* process is detailed in Practice **E1527**.

3.2.14 *good faith*, *n*—absence of any intention to seek an unfair advantage or to defraud another party; an honest and sincere intention to fulfill one’s obligations in the conduct of a transaction. (Refer to Practice **E1527**.)

3.2.15 *gross floor area (GFA)*, *n*—area on all floor levels within the perimeter of the outside walls of a building as measured from the inside 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 leasable or rentable area, 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 practice, for example, in the determination of *energy useconsumption intensity*.

3.2.16 *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>.

3.2.17 *heating value*, *n*—amount of heat produced by the complete combustion of a unit quantity of fuel. For the purposes of this practice, higher heating value (HHV) is used to convert the quantity of fuel to its energy content.

3.2.18 *interviews*, *n*—discussions with those knowledgeable about the property. (Refer to Guide **E2018**.)

3.2.19 *key site manager*, *n*—person identified by the *owner* or *operator* of a property as having knowledge of the physical and operational characteristics of the building or buildings on a property. (Refer to Practice **E1527**.)

3.2.20 *lower limit scenario*, *n*—with respect to building *energy useconsumption* or *EUH,ECI*, a reasonable lower limit for *energy useconsumption* or *EUHECI* at the building (see subsection **11.4.1.4**). The lower limit scenario is determined using the 25th percentile for *HDD,CDD* and all other independent variables in the building *energy useconsumption equation*.

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

3.2.22 *normalize*, *v*—to reduce to a norm, such as normalizing building *energy useconsumption* by removing the influence of weather or building *gross floor area* or other conditions (referred to as normalizing factors). For example, to normalize a building’s *energy useconsumption* (in  $\frac{\text{kBTU}}{\text{yr}}$  or  $\frac{\text{kBtu}}{\text{yr}}$ ) using the building’s *gross floor area* (in square feet), divide building *energy useconsumption* by the gross floor area. The resulting normalized quotient is in units of  $\frac{\text{kBtu}}{\text{SF}\cdot\text{yr}}$ , also referred to as the *energy useconsumption intensity*.

3.2.23 *observation*, *n*—visual note of specific items, systems, conditions, or components that are observed during a *walk-through*. (Refer to Guide **E2018**.)

3.2.24 *occupancy*, *n*—occupied tenant space in a building. The *occupancy* rate generally refers to the occupied space in a building divided by the total space available to be occupied, generally represented as a percentage. Leased space is not always occupied space, as the tenant may have left the space, but may still be paying the monthly lease cost under terms of the lease agreement.

3.2.25 *occupants*, *n*—those tenants, subtenants, or other persons or entities using the property or a portion of the property. (Refer to Practice **E1527**.)

3.2.26 *operator, n*—person responsible for, or the designated representative of the organization responsible for the overall operation of a property. (Refer to Practice [E1527](#).)

3.2.27 *owner, n*—generally the fee *owner* of record of the property. (Refer to Practice [E1527](#).)

3.2.28 *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. (Refer to Practice [E1527](#).)

3.2.29 *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.

3.2.30 *pro forma building energy use, consumption, n*—building *energy use, consumption* (e.g., kBtu) determined from the *energy use, consumption equation* using the mean values for the independent variables, or the trailing twelve months of building *energy use, consumption* data if the independent variables identified in subsection [11.4.1](#) are within 15 % of the mean. *Pro forma building energy use, consumption* is considered representative of annual building *energy use, consumption* at the time of the *commercial real estate transaction* and is sometimes referred to as normalized building *energy use, consumption*. *Pro forma building energy use, consumption* is designed to reduce the influence [on building *energy use, consumption*] of biases such as unusual weather conditions (for example, an unusually warm winter or cool summer) or unusual building operational conditions (for example, an unusually high *vacancy rate*), etc.

3.2.31 *pro forma building energy use, consumption intensity, n*—building *energy use, consumption intensity* (e.g., kBtu/SF) determined from the *energy use, consumption equation* using the mean values for the independent variables, or the trailing twelve months of building *energy use, consumption intensity* data if the independent variables identified in subsection [11.4.1](#) are within 15 % of the mean. *Pro forma building energy use, consumption intensity* is considered representative of annual building *energy use, consumption intensity* at the time of the *commercial real estate transaction* and is sometimes referred to as the normalized building *energy use, consumption intensity*. *Pro forma building energy use, consumption intensity* is designed to reduce the influence [on building *energy use, consumption intensity*] of biases such as unusual weather conditions (for example, an unusually warm winter or cool summer) or unusual building operational conditions (for example, an unusually high *vacancy rate*), etc.

3.2.32 *pro forma building energy cost, n*—obtained by dividing actual trailing 12 month total cost (\$) associated with each energy source used at the building by the associated *energy use, consumption* of the source (kBtu/yr), and then summing these values to get the total trailing 12 month building energy cost multiplier (\$/kBtu/yr). The total trailing 12 month building energy cost multiplier is then multiplied by the average case scenario for annual *site energy use, consumption* (see subsection [11.4.1.4\(1\)](#)). *Pro forma building energy cost* is considered representative of average annual building energy cost at the time of the *commercial real estate transaction*. *Pro forma building energy cost* is designed to reduce the influence [on building energy cost] of biases such as unusual weather conditions (for example, an unusually warm winter or cool summer) or unusual building operational conditions (for example, an unusually high *vacancy rate*), etc. *Pro forma building energy cost* may also be determined on square foot (*gross floor area*) basis.

3.2.33 *property condition assessment, 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. A *property condition assessment* is detailed in Guide [E2018](#).

3.2.34 *qualified consultant or individual, n*—person having the education, training, and experience necessary for the conduct of this practice (see also [Appendix X4](#)). The person may be an independent contractor or an employee of the *user*.

3.2.35 *real estate transaction, n*—transfer of title to or possession of real estate, rental of space in real estate under a lease for a set period of time in return for consideration, a transfer of a leasehold interesting real estate, or receipt of a security interest in real estate.

3.2.36 *reasonably ascertainable, adj*—information that is *readily available, practically reviewable*, and available at a nominal cost for retrieval, reproduction, or forwarding. (Refer to Practice [E1527](#).)

3.2.37 *readily accessible, adj*—describes *easily visible* areas of a property that are promptly made available for *observation* by the

*qualified consultant or individual* conducting the *walk-through* and do 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 Guide E2018.)

3.2.38 *readily available, adv*—describes 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. (Refer to Practice E1527.)

3.2.39 *renewable energy, n*—means a source of energy that occurs naturally or is regenerated naturally, including, without limitation: (a) Biomass; (b) Fuel cells; (c) Geothermal energy; (d) Solar energy; (e) Waste heat (such as produced in a combined heat and power system); (f) Waterpower (hydro); and (g) Wind.

- (a) Biomass;
- (b) Fuel cells;
- (c) Geothermal energy;
- (d) Solar energy;
- (e) Waste heat (such as produced in a combined heat and power system);
- (f) Waterpower (hydro); and
- (g) Wind.

3.2.39.1 *Discussion*—

The term does not include coal, natural gas, oil, propane or any other fossil fuel, or nuclear energy. *Renewable energy* systems may also be referred to as alternative energy systems.

3.2.40 *report, n*—written information prepared by a *qualified consultant or individual* and constituting an integral part of a *Building Energy Performance Assessment* as required by this practice.

3.2.41 *reporting period*—the period over which the amount of building energy *use:consumption* and costs are evaluated after the installation of energy conservation and/or *renewable energy* measures.

3.2.42 *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.

3.2.43 *site energy use:consumption, n*—amount of heat and electricity consumed by a building as reflected in its utility/energy bills or on-site generation or both, if any. *Site energy use:consumption* may also be referred to as *building energy use:consumption*. *Site energy* may be delivered to a building in one of two forms: *primary energy* or *secondary energy* or both. *Energy use:consumption* and the methodology developed in this practice are based upon *site energy use:consumption*.

3.2.43.1 *Discussion*—

*Site energy use:consumption* is different from *source energy use:consumption*. *Source energy use:consumption* represents the total amount of raw fuel that is required to meet a building's energy needs and incorporates transmission, delivery, and production losses at/from the source (such as the local power plant). While *source energy* is not specifically used in the methodology associated with this practice, it is used by U.S. EPA to determine a building's greenhouse gas (carbon) emissions associated with combustion processes (refer to Appendix X9).

3.2.44 *site visit, n*—that part of the practice contained in Section 8 during which the *qualified consultant's* or *individual's walk-through* of the property takes place.

3.2.45 *total energy use:consumption, n*—sum of all energy consumed in the building, including purchased energy plus energy consumed on-site. Energy produced by the *renewable energy* systems is identified separately and may be netted out from building *total energy use:consumption*.

3.2.46 *upper limit scenario, n*—with respect to building energy *use:consumption* or *EUI, ECI*, a reasonable upper limit for energy *use:consumption* or *EUI, ECI* at the building (see subsection 11.4.1.4). The upper limit scenario is determined using the 75th percentile for *HDD, CDD*, and all other independent variables used in the building energy *use:consumption* equation.

3.2.47 *user, n*—party seeking to use this practice to complete a *building energy performance assessment*. 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.

3.2.48 *utility-energy bills/utility-energy data*, *n*—invoices from companies that provide energy to a building, including utility/energy companies, such as those that provide electricity, natural gas, district steam, district hot water, or district chilled water to a property, and companies that deliver oil, propane, kerosene, coal, coke, wood, or other fuels used at the building.

3.2.49 *vacancy*, *n*—empty or unoccupied tenant space in a building. The *vacancy* rate generally refers to the empty or unoccupied space in a building divided by the total space available to be occupied, generally represented as a percentage. If a tenant has left a space but still continues to pay rent on the vacated space in accordance with his or her lease obligation, the space is considered vacant for the purposes of this practice.

3.2.50 *walk-through*, *n*—conducted during the *site visit* consisting of *easily visible observations* of readily accessible major building components and systems that can impact building *energy use:consumption*.

### 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 *BEPA*—*Building energy performance assessment*

3.3.4 *BTU*—British thermal units

3.3.5 *CDD*—*Cooling degree days*

3.3.6 *ECI*—*Energy consumption intensity* (typically in units of kBtu/SF)

3.3.7 *ECM*—Energy conservation measure

3.3.8 *EPA*—U.S. Environmental Protection Agency

3.3.9 *ESA*—*Environmental site assessment*

3.3.8 *EUI*—*Energy use intensity* (typically in units of kBtu/SF)

3.3.10 *GFA*—Gross floor area associated with a building

3.3.11 *GHG*—Greenhouse gas

3.3.12 *GWh*—Gigawatt ( $10^9$  Watt) hour

3.3.13 *HDD*—*Heating degree days*

3.3.14 *HHV*—Higher *heating value*

3.3.15 *HVAC*—Heating, ventilation, and air conditioning

3.3.16 *kBtu*—Kilo ( $10^3$ ) British thermal units (Btu)

3.3.17 *kW*—kilowatt ( $10^3$  Watt)

3.3.18 *kWh*—kilowatt ( $10^3$  Watt) hour

3.3.19 *MBtu*—million ( $10^6$ ) British thermal units (Btu)

3.3.20 *MWh*—megawatt ( $10^6$  watt) hour



- 3.3.21 *NERC*—North America Electric Reliability Council
- 3.3.22 *NOAA*—National Oceanic and Atmospheric Administration
- 3.3.23 *NOI*—Net operating income
- 3.3.24 *OCC*—Occupancy
- 3.3.25 *PCA*—*Property condition assessment*
- 3.3.26 *ROI*—Return on investment
- 3.3.27 *SF*—Square foot [gross square feet of building]

#### 4. Significance and Use

4.1 *Uses*—This practice is intended for use on a voluntary basis by parties who wish to conduct a *BEPA* on a building. The process defined in this practice involves the collection of building *energy use/consumption* information, some of which may be collected as part of ~~Guide E2018 PCA~~ or ~~Practice E1527 ESA~~. The practice is intended primarily as an approach to conducting a standardized inquiry designed to identify representative *building energy performance* in connection with a commercial property involved in a *real estate transaction*. This practice is intended to reflect a commercially practical and reasonable inquiry.

4.1.1 A number of states including CA, CO, WA and NJ, and more than three dozen cities, county and municipal governments, including Ann Arbor, MI, Atlanta, GA, Austin, TX, Berkeley, CA, Bloomington, MN, Boston, MA, Boulder, CO, Cambridge, MA, Chicago, IL, Chula Vista, CA, Columbus, OH, Denver, CO, Des Moines, IA, Edina, MN, Evanston, IL, Fort Collins, CO, Indianapolis, IN, Kansas City, MO, Los Angeles, CA, Miami, FL, Minneapolis, MN, Montgomery County, MD, New York City, NY, Orlando, FL, Philadelphia, PA, Pittsburgh, PA, Portland, ME, Portland, OR, Reno, NV, Salt Lake City, UT, San Diego, CA, San Francisco, CA, San Jose, CA, Seattle, WA, South Portland, ME, St. Louis, MO, St. Louis Park, MN, St. Paul, MN and Washington, D.C. have building energy performance benchmarking and reporting policies. *Users* in these locations must comply with applicable ordinances and regulations.

#### 4.2 Clarifications on Use:

[ASTM E2797-22](https://standards.astro.org/catalog/standards/sist/78d149a6-d813-4fee-a25a-07d9910f9c5/astm-e2797-22)

<https://standards.astro.org/catalog/standards/sist/78d149a6-d813-4fee-a25a-07d9910f9c5/astm-e2797-22>

4.2.1 *Use in Conjunction with ~~Guide E2018 PCA~~ or ~~Practice E1527~~—E1527 ESA*—This practice, when added as a supplemental scope of work to a ~~Guide E2018 PCA~~ or a ~~Practice E1527 ESA~~, is designed to assist the *user* and *consultant* in developing information about *energy use/consumption* in a building or buildings involved in a *real estate transaction*. The *BEPA* also has utility to a wide range of persons, including those who may not be involved in a *real estate transaction*.

4.2.2 *Independent Use*—This practice may also be used independently of any other building assessment to determine *building energy performance*.

4.2.3 *Site-Specific*—This practice is property-specific in that it relates to existing *building energy performance*. The practice is not intended to replace ~~Guide E2018 PCA~~ or ~~Practice E1527 ESA~~ conducted by a *qualified consultant* or *individual*, but rather to supplement it.

4.3 *Who May Conduct*—A *BEPA* shall 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 practice (see **Appendix X4**). 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 this *BEPA*.

4.4 *Additional Services*—As set forth in Section 13, additional services may be contracted for between the *user* and the *Consultant*. Such additional services may include issues not included within the scope of this practice. For example, the *user* or *Consultant* may wish to benchmark the building against similar buildings in the portfolio or in the same geographical area or identify select green building attributes that may contribute to the energy efficiency performance and/or the building’s valuation.

4.4.1 *Benchmarking Additional Service*—Any benchmarking system selected relies on critical data in generating its output, so the validity of the data collection process directly impacts the integrity and usefulness of the benchmarking system’s results. Utilization of this practice and adoption of its data collection approach can serve to enhance the integrity of the benchmarking process for all transactional stakeholders in a standardized, fully transparent, uniform, and consistent manner. Notwithstanding, building *energy use* information should always be evaluated within the context in which it is collected and building *energy use* numbers should not be used without conveying this context. (Refer to **Appendix X1** for additional information.)

4.5 *Principles*—The following principles are an integral part of this practice 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 *BEPA*.

4.5.1 *Uncertainty Not Eliminated in BEPA*—No *BEPA* practice can wholly eliminate uncertainty in determining the myriad of variables that can impact the *energy use* of a building on a property. The *BEPA* is intended to reduce, but not eliminate, uncertainty regarding the impact such variables can have on the *energy use* of a building.

4.5.2 *Not Exhaustive*—This practice is not meant to be an exhaustive assessment. There is a point at which the cost of 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 *real estate transaction*. One of the purposes of this practice is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing a *BEPA* 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 will be guided by the type of property subject to assessment and its complexity, 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-practice. No specific legal relationship between the *Consultant* and *user* was considered during the preparation of this practice.

## 5. Relationship to Practice **E2018** *E2018-PCA* and Practice **E1527** *E1527-ESA*

5.1 *Building Energy Performance Data Collected in Guide **E2018***—ASTM Guide **E2018** is directed principally at the physical status of a building and associated property, including the building’s structure, electrical and mechanical systems, HVAC, heating, ventilation and air conditioning 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. While Guide **E2018** does include identification of utilities provided to the property for heating, ventilation, and cooling equipment and other energy-related uses, it does not include the collection of building *energy use* information. This practice is intended to supplement Guide **E2018** when a *user* requests that *building energy performance* information be included in the *PCA*.

5.2 *Building Energy Performance Data Collected in Practice **E1527***—ASTM Practice **E1527** is directed principally at the environmental condition of the property, including whether known or suspect environmental contamination is associated with the property. Building *energy use* can impact the environment by directly or indirectly contributing to carbon emissions that may contribute to climate change. While Practice **E1527** includes a building *walk-through*, interviews with key site personnel and collection of select building characteristics, it does not include the collection of building *energy use* information. This practice is intended to supplement Practice **E1527** when a *user* requests that *building energy performance* information be included in the *ESA*.

5.3 *BEPA*—This practice is intended to be used independently or as a supplement to Guide **E2018** *PCA* or Practice **E1527** *ESA*.

5.3.1 The *BEPA* may be conducted concurrently with Guide **E2018** *PCA* or Practice **E1527** *ESA*.

5.3.2 The *BEPA* may be conducted independently of Guide **E2018** *PCA* or Practice **E1527** *ESA*. When conducting a *BEPA* independent of Guide **E2018** *PCA* or Practice **E1527** *ESA*, the data requirements specified in this practice shall be collected.

## 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 *BEPA* on a building connected to a *real estate transaction*. These tasks do not require the technical expertise of a *Consultant* and are generally not performed by *Consultants* performing a *PCA* or *ESA*, unless directed to do so by the *user*. In a *real estate transaction*, it is common for the *user* to be the prospective property purchaser (the buyer), with the *Consultant* working for this *user*. The *user* may also be an existing or prospective tenant at the property. ~~Notwithstanding, the relevant information about the building is best obtained from the property owner (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 or ESA process). If the property owner (e.g., seller) is unwilling to provide building energy use and cost information, a BEPA cannot be performed. Appendix X5 provides a sample of information that may be collected from the property owner, operator or key site manager and which can assist the user and/or the Consultant gathering information on the building that may be material to the BEPA in connection with the real estate transaction.~~

6.1.1 *Discussion*—~~Notwithstanding, the relevant information about the building is best obtained from the property owner (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 or ESA process). If the property owner (e.g., seller) is unwilling to provide building energy consumption and cost information, a BEPA cannot be performed. Appendix X5 provides a sample of information that may be collected from the property owner, operator or key site manager and which can assist the user and/or the Consultant gathering information on the building that may be material to the BEPA in connection with the real estate transaction.~~

6.2 *Specialized Knowledge or Experience of the User*—If the *user* has any specialized knowledge or experience that is material to the *BEPA* in connection with the building, 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 *BEPA*.

6.3 *Nonresponsiveness*—~~*Non-responsiveness*~~—If the *user* is unable to obtain the information requested directly from the property owner (or seller in a *real estate transaction*) or a designated representative, the *user* shall 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 (e.g., seller) is unwilling to provide building energy ~~use~~consumption and cost information, a *BEPA* cannot be performed.

6.4 *Other*—Either the *user* shall make known to the *Consultant* the reason why the *user* wants to have the *BEPA* performed (such as, for example, to meet a regulatory requirement or a financing requirement or a due diligence requirement) or, if the *user* does not identify the purpose of the *BEPA*, the *Consultant* shall assume the purpose is to evaluate *building energy performance* for the *user*. The *user* and the *Consultant* may also need to modify the scope of services performed under this practice for special circumstances, including, but not limited to, unique local or site-specific conditions.

6.5 *Non-existent Legal Obligation*—*Nothing in this practice 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 practice.*

## 7. Building Energy Performance Assessment (BEPA) Process

7.1 *Objective*—The purpose of the *BEPA* described in this practice is to identify, to the extent feasible pursuant to the processes prescribed herein, *building energy performance* in connection with a *commercial real estate transaction*. Such *building energy performance* shall include: (1) historical *building energy performance* over the previous three years, with a minimum of one year, or back to the last building *major renovation* (if completed less than three years ago); (2) the range of building energy ~~use~~consumption and cost under average, upper limit and lower limit scenarios as defined in this practice (see subsection 11.4.1.4); (3) the *pro forma building energy use*consumption and *pro forma building energy cost* (see subsections 11.5 and 11.6); and (4) *appropriate reporting* of building energy ~~use~~consumption and cost information to the *user* or other *user*-designated parties. The *BEPA* process described in this practice is intended to be used independently, or to supplement but not replace existing Guide E2018 *PCA* or Practice E1527 *ESA*.

**7.2 Report**—A separate *report* shall be prepared, unless the *BEPA* is being performed as part of an ~~Guide E2018~~ *PCA* or ~~Practice E1527~~ *ESA* conducted on a property connected to a *commercial real estate transaction*, in which case the *BEPA* findings and conclusions can be provided in the *PCA* or *ESA report*.

**7.2.1 Components**—A *BEPA* shall have five components described as follows:

**7.2.1.1 Site visit**—To observe the building during the *walk-through*, conduct *interviews* (see **7.2.1.2**), and collect records (see **7.2.1.3**) not previously provided to the *Consultant*; see Section 8.

**7.2.1.2 Interviews**—With the present *owner, operator*, and/or *key site manager* at the building; see Section 9.

**7.2.1.3 Records collection**—Collect and compile the records necessary to conduct the *BEPA*; see Section 10.

**7.2.1.4 Records review and analysis**—Review and analysis of records necessary to conduct the *BEPA*; see Section 11.

**7.2.1.5 Report**—On the findings related to building *energy use/consumption* and energy cost; see Section 12.

**7.3 Coordination of Parts:**

**7.3.1 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.

**7.3.2 User's Obligations**—The *Consultant* shall note in the *report* whether or not the *user* has provided the *Consultant* with information pursuant to Section 6 of this practice.

**7.4 Consultant Conducting a BEPA:**

**7.4.1 Consultant's Duties**—The *BEPA* shall be performed by a *qualified Consultant* or *individual* (the “*Consultant*”) or performed by others under the supervision of the *Consultant*. This can be the same individual(s) responsible for conducting the ~~Guide E2018~~ *PCA* or ~~Practice E1527~~ *ESA*. The assessment shall be performed by a person possessing sufficient knowledge, training, and experience necessary to conduct the site *walk-through, interviews*, data collection, and analysis defined in this practice and having the ability to identify issues relevant to *building energy performance* in connection with a building involved in a *real estate transaction*. At a minimum, the *Consultant* shall be involved in planning the assessment and the review and interpretation of the information upon which the *BEPA report* is based. **Appendix X4** provides suggested qualifications for the *Consultant* responsible for conducting the *BEPA*.

**7.4.2 Information Obtained From Others**—Information for the records review needed for completion of a *BEPA* may be provided by a number of parties including the *user* or a designated representative; the building *owner, operator*, or *key site manager*; the local utility or energy provider; government agencies; or third-party vendors.

**7.5 Applicable Property Types for a BEPA**—A *BEPA* as described in this practice is appropriate for property where utility/energy costs are centralized and paid by the property *owner, manager*, or *operator* and may include, but are not limited to, office, retail, hotel/lodging, warehouse, multifamily and industrial properties. If *energy use/consumption* is not centralized such as in individual, separately metered units at multifamily-type properties or in separately metered tenant spaces at commercial office or retail buildings where energy costs are individually paid for by tenants, a *BEPA* as described in this practice is applicable only if unit or tenant space utility data is made available to the person conducting the *BEPA*. If only a sampling of unit or tenant space utility data is made available to the person conducting the *BEPA*, such sampling can be used only if it is: (1) judged to be representative of unit or tenant space at the building and (2) sufficient to estimate *energy use/consumption* for all tenants at the building.

**7.6 Reliance**—A *Consultant* is not required to verify independently the information provided by others and may rely on the information provided unless he or she has *actual knowledge* that certain information is incorrect, or unless it is obvious that certain information is incorrect based on the *Consultant's* experience or other information obtained in the *BEPA*.

## 8. Site Visit

8.1 *Objective*—The objective of the *site visit* is to: (1) interview persons at the building who are knowledgeable about building energy *use* consumption and cost (see Section 9); (2) observe major building systems that can impact energy *use* consumption; (3) collect available utility and other records, if not previously provided, including operation and maintenance data, from either building personnel or the utility/energy service provider servicing the property that will assist in analysis of building energy *use* consumption (see Section 10); and (4) verify the information received, to the extent possible.

8.2 *Interviewing Knowledgeable Personnel during the Site Visit*—See Section 9.

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

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

8.3 *Observation during the Building Walk-Through*—Major building and site components that can impact energy *use* consumption shall be visually observed. A sample checklist of the information that may be collected during the *walk-through* and *interviews* is included in Appendix X8.

8.3.1 *Exterior*—The periphery of the building shall be visually observed. If lighted open air parking is associated with the building, this shall be noted.

8.3.2 *Interior*—The interior of the building, accessible common areas expected to be used by *occupants* or the public (such as lobbies, hallways, utility rooms, recreation areas, and so forth), maintenance and repair areas, including boiler rooms, and a representative sample of occupant spaces, shall be visually observed. It is not necessary to look under floors, above ceilings, inside equipment, or behind walls. The number of electric meters (and what they monitor) shall be visually observed.

8.4 *Obtaining Information on Building Characteristics*—*Observations* and *interviews* shall be used to provide a comprehensive building description in the *report* (refer to subsection 10.2 and Appendix X5). ASHRAE Procedures for Commercial Building Energy Audits may be used as a template.

<https://standards.iteh.ai/catalog/standards/sist/78d149a6-db13-4fee-a25a-0729910f9c5/astm-e2797-22>

8.5 *Collecting Available Building Energy Use Consumption and Cost Records at the Site*—See Section 10.

8.5.1 Before the *site visit*, the *Consultant* shall 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 (see subsections 10.2 and 10.3) either to be forwarded before the *site visit* or be available for review during the *site visit*.

8.5.2 During the *site visit*, *Consultant* shall collect the following information, or confirm that such information collected prior to the *site visit* is complete.

8.5.2.1 Building energy *use* consumption records over the previous three years, or back to the last *major renovation* (if less than 3 years ago), with a minimum period of one year.

8.5.2.2 Building energy cost records over the previous three years, or back to the last *major renovation* (if less than 3 years ago), with a minimum period of one year.

8.5.2.3 Other pertinent building energy *use* consumption records or reports such as may be available, including, but not limited to energy audit reports, operation and maintenance records, as-built drawings, energy labeling reports (refer to Appendix X2, for example, ASHRAE or ENERGY STAR labeling reports), or green building rating or certification reports (refer to Appendix X2, for example, LEED certification or Green Globes certification reports).

8.6 *Review of Helpful Documents*—Before the *site visit*, the *property owner, key site manager*, or the *user* shall be asked if they know whether any of the information listed in 10.2 and 10.3 exist and, if so, whether copies can and will be provided to the