

**SUSTAINABLE DESIGN OF FACILITIES**

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This mandatory functional series document is available to all online at <https://engstandards.lanl.gov>. It derives from P342, Engineering Standards, which is issued under the authority of the Division Leader of Engineering Services as part of the Conduct of Engineering program implementation at the Laboratory.

**CONTACT THE SUSTAINABLE DESIGN STANDARDS [POC](#) for interpretation, variance, and [suggestions](#) (LANL-only)**

**New in this revision (older revisions listed in Record of Revisions at the end)**

Adopted ASHRAE 90.1-2016 (and 2019 when mandated) to align with 2018 IECC. Mandated new 2020 GPs. Added Zero Carbon Emissions Ready requirements per EO 14057. Added Attachment 2 on metering per VAR-10538. Added Definitions and Bases for Requirements; clarified requirements throughout, moved much guidance to references maintained on chapter webpage. Deleted references to specific versions. Added Requirements ID Log references and moved bases/footnotes to log (LANL internal-use log posted with chapter).

**ACRONYMS, TERMS, AND DEFINITIONS**

<b>Acronym</b>	<b>Definition</b>
<b>ASHRAE 90.1</b>	<i>ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings</i>
<b>EPP</b>	Environmentally Preferable Products
<b>FEMP</b>	Federal Energy Management Program (DOE organization behind DOE-specific energy mandates)
<b>GBCI</b>	Green Business Certification Inc.: the certifying agency for LEED and other certification systems.
<b>GP</b>	The group of criteria defined by <a href="#">Guiding Principles for Sustainable Federal Buildings and Associated Instructions</a> issued by the Council on Environmental Quality in December of 2020. Often referred to as "The Guiding Principles", the document outlines a set of sustainable principles and practices to guide agencies in designing, locating, constructing, maintaining, and operating Federal buildings in a sustainable manner.
<b>IEBC</b>	<i>International Existing Building Code</i> , published by the International Code Council
<b>IECC</b>	<i>International Energy Conservation Code</i> , published by the International Code Council
<b>IgCC</b>	<i>International Green Construction Code</i> , published by the International Code Council. While not adopted by LANL, it is frequently used as a compliance path in the <i>Guiding Principles for Sustainable Federal Buildings</i> .
<b>LCC</b>	<a href="#">Life Cycle Cost</a> (discussed in detail at this link)
<b>LEED</b>	Leadership in Energy and Environmental Design: a green building rating systems developed by United States Green Building Council (USGBC) and certified by Green Business Certification Inc. (GBCI).
<b>SD</b>	Sustainable Design (green building)
<b>USGBC</b>	United States Green Building Council: the organization that developed the Leadership in Energy and Environmental Design (LEED), a green building certification system.

<b>Term</b>	<b>Definition</b> (adapted from <i>Guiding Principles for Sustainable Federal Buildings</i> and elsewhere)
<b>Federal High-Performance Building</b>	A federal building which does not meet all requisite criteria outlined in the <i>Guiding Principles for Sustainable Federal Buildings</i> ; due to its inherent function, mission, safety, or other factor; but which has optimized the GP's criteria on a life cycle basis.
<b>Green Building Certification System</b>	A type of building certification system that rates or rewards relative levels of compliance or performance with specific environmental goals and requirements. Rating systems and certification systems are terms frequently used interchangeably. Examples include: Guiding Principles, LEED, Green Globes, and Living Building Challenge.

<b>Modernization</b>	The comprehensive replacement or restoration of virtually all major systems (such as plumbing, mechanical, electrical), interior finishes (such as ceilings, partitions, doors, and floor finishes), and building features (as in space reconfiguration or exterior wall, window, or roof replacement).
<b>Zero Carbon Emissions Ready Building</b>	A highly efficient building which has been designed and built to make use of — or plans for the future of if not initially life-cycle cost-effective — carbon-free energy for all of its operational energy needs through the use of any combination of on-building, on-site, local utility-scale, or purchased carbon-free energy.
<b>Sustainable Federal Building</b>	A federal building which has been designated as meeting the requisite criteria outlined in the <i>Guiding Principles for Sustainable Federal Buildings</i> .

## 1.0 REQUIREMENTS

**CAUTION:** The project impact of this chapter can be significant and warrants review early in the project planning and programming phases, such as CD-0 and CD-1.

A project’s scope will determine the sustainable design and construction requirements for the project based on the following list of Federal Regulations (CFR), U.S. Code, and DOE/NNSA orders, as well as by LANL-adopted building codes. **This subject is evolving rapidly, so check the materials included with the [Chapter References](#) for latest mandates and guidance.**

<b>7 USC 8102</b>	Title 7-Agriculture, Chapter 107-Renewable Energy Research and Development, 8102-Biobased markets program, requires the use of biobased products.
<b>10 CFR 433</b>	Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi-Family High-Rise Residential Buildings. Para. 433.8 requires life-cycle cost-effectiveness. Subpart A establishes energy efficiency performance requirements and Subpart C establishes green building certification requirements for Federal buildings.
<b>10 CFR 436</b>	Federal Energy Management and Planning Programs: sets forth rules for energy management and planning to reduce energy consumption and promoting life cycle cost analysis. Subpart C requires the use of efficient energy using equipment.
<b>42 USC 6834</b>	Title 42-The Public Health and Welfare, Chapter 81-Energy Conservation and Resource Renewal, Subchapter II-Energy Conservation Standards for New Buildings, (a)(3)(A)(iii) requires solar hot water in new Federal, and buildings undergoing a major renovation (modernization).
<b>42 USC 6962</b>	Title 42-The Public Health and Welfare, Chapter 82-Solid Waste, Subchapter VI-Federal Responsibilities, 6962-Federal procurement, requires the use of materials with recycled content.
<b>DOE O 413.3B, Chg. 6</b>	Program and Project Management for the Acquisition of Capital Assets
<b>DOE O 436.1</b>	Departmental Sustainability
<b>EO 14057</b>	Executive Order on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, which states that “Each agency shall achieve net-zero emissions across its portfolio of buildings, campuses, and installations by

	2045 and reduce greenhouse gas emissions by 50 percent from buildings, campuses, and installations by 2032 from 2008 levels, prioritizing improvement of energy efficiency and the elimination of onsite fossil fuel use."
<b>NNSA SD 430.1</b>	Real Property Asset Management. <i>Note: Its CRD implements the order and its mention of the NNSA RPO's SD requirements at 10.0 leads to following the GPs.</i>

**TABLE 1. Major SD Requirement Applicability**

Note: Each column heading refers to a section heading that follows Table 1.

Project Scope	Minimum Requirement(s)							
	IECC or 90.1 <sup>1</sup>	10 CFR 436 (Subpart C)	10 CFR 433	GP	LEED Gold	Efficient Labs	Green Purchasing	Zero Carbon Emissions Ready
	Corresponding to the following Sections:							
	A	B	C	D	E	F	G	H
"Alteration" <sup>2</sup> or "repair" of buildings and building systems	X	X					X	
New (or additions to) buildings	X	X	X				X	
New (or additions to) buildings over 5000 sq. ft.		X	X	X			X	
Modernization of buildings over 5000 sq. ft.				X			X	
New buildings, modernizations, and additions over \$50M		X	X	X <sup>3</sup>	X		X	
Laboratories or fume hoods <sup>4</sup>						X	X	
New buildings or modernization over 25,000 sq. ft.		X		X	X		X	X

*Guidance: When a project is required to achieve both Guiding Principles and LEED certifications it is recommended to follow the streamlined process provided by GBCI to avoid duplicative work and reduce review fees.*

<sup>1</sup> ASHRAE 90.1 is an alternate compliance path within the IECC.

<sup>2</sup> LANL-centric IEBC alteration definitions are in ESM Ch 16, [IBC-GEN](#) Form 1 Preliminary Project Determinations.

<sup>3</sup> Compliance with LEED will not automatically equate to compliance with the GPs. See Appendix A for additional GP expectations.

<sup>4</sup> Efficient Lab requirements are in addition to all other applicable requirements in Table 1.

- A. **IECC or ASHRAE 90.1: Building and system alterations and repairs** meeting LANL-centric versions of International Existing Building Code (IEBC) definitions of same<sup>2</sup> shall meet energy conservation requirements of the IEBC and IECC—see IECC-Commercial Provisions Chapter 5 [CE]—or simply follow the corresponding version of ASHRAE 90.1. When using the IECC, follow the more stringent of IECC or the New Mexico Commercial Energy Conservation Code (see ESM [Chapter 16](#) Section IBC-GEN Att A for editions and details on both).<sup>5</sup>
- B. **Code of Federal Regulations: 10 CFR 436 Subpart C Agency Procurement of Energy Efficient Products.** Projects that involve installation, alterations, repair, or replacement of energy using equipment or services, shall meet the Federal requirements.
1. Select energy-consuming products and services consistent with the criteria of [ENERGY STAR](#) and [FEMP-designated energy-efficient products](#) in accordance with 10 CFR 436.40-436.43.
  2. If ENERGY STAR/FEMP equipment is found to not be LCC effective (using the LCC analysis in 10 CFR 436, subpart A), document conclusion and submit for LANL acceptance. Email [site-sustainability@lanl.gov](mailto:site-sustainability@lanl.gov).
- Guidance:*
- Subpart A of 10 CFR 436 points out that insignificant costs for energy or water saving equipment is to be automatically presumed LCCE and therefore no LCC analysis is needed. It also defines instances when it can be presumed not to be cost-effective.*
- When multiple, separate projects, in their entirety, may result in extensive alterations or modernization of a building greater than 5000 square feet, projects should consider coordinating with the Sustainability Program, and other projects to design with the intent to meet the Guiding Principles for Sustainable Federal Buildings, see Guiding Principles section below and guidance posted with Chapter.*
- C. **Code of Federal Regulations: 10 CFR 433 Subpart A (New construction only)**
1. Design new buildings and additions in accordance with 10 CFR 433 by meeting ASHRAE 90.1-2016<sup>6</sup> and, if life-cycle cost-effective, achieve energy consumption levels that are at least 30% below the levels of ASHRAE 90.1-2016 Baseline Building. (Requirement 14-0001) Note: Use 2019 edition beginning April 7, 2023; sooner if required by Project.
    - a. Energy consumption for the purposes of calculating the 30% savings requirements shall include the building envelope and energy consuming systems normally specified as part of the building design by ASHRAE 90.1 such as space heating, space cooling, ventilation, service water heating, and lighting but shall not include receptacle and process loads not within the scope of ASHRAE 90.1 such as specialized medical or research equipment and equipment used in manufacturing processes. Energy consumption levels for both the ASHRAE Baseline Building and proposed building shall be determined by using the **Performance Rating Method found in Appendix G of ASHRAE 90.1** (and provide for LANL review)
    - b. If a 30-percent reduction is not life-cycle cost-effective, the design shall be modified to achieve an energy consumption level at or better than the maximum

<sup>5</sup> Re IECC and NMCECC, the most stringent is required by ESM Chapter 1 Section Z10. For extensive modifications and new buildings, additions, and modernizations meet the more stringent requirements (10CFR433, GP, LEED, etc.), compliance with IECC and NMCECC is assumed.

<sup>6</sup> Projects may opt to use the 2019 baseline immediately.

level of energy efficiency that is LCC effective, but at a minimum complies with ASHRAE 90.1-2016. (2019 edition beginning April 7, 2023; sooner if required by Project.)

2. In analyzing the life-cycle costs of design options, compare the following:
  - a. The cost to retrofit fossil-fuel burning equipment, if used, or modify the facility, to reach zero carbon emissions by 2030 (if over 25,000 GSF) or by 2045 (if less than 25,000 GSF).
  - b. A Zero Carbon Emissions Ready Building such that the addition of solar panels or other renewable energy technologies would create zero emissions building operation, aligning with Guiding Principle 2.3 requiring LCC analysis of renewable electric energy sources.
  - c. A fully zero-carbon-emissions building.

*Guidance: Access ASHRAE 90.1 training slides from the link web posted with this Chapter. Also, the 90.1 User's Manual is a 'must have' when addressing anything in the Standard.*

#### D. Guiding Principles (GP) for Sustainable Federal Buildings

1. New construction, additions, and modernization of buildings<sup>7</sup> over 5,000 square feet shall comply with the requisite criteria of the most current [Guiding Principles for Sustainable Federal Buildings](#) by meeting 18 core and 9 out-of-12 non-core criteria of the GP [NNSA SD 430.1; DOE O 436.1].
  - a. The building's inherent function, mission, safety, or designation may preclude it from meeting the minimum threshold of requisite criteria in a life cycle cost-effective manner [U.S.C. § 17061(12)]. Buildings that have met as many of the requisite criteria that are life cycle cost-effective may be designated as a "Federal high-performance building." GP performance must be tracked and reported throughout the project regardless of expected outcome.
2. Project management must establish roles and responsibilities for project verification and identify such in RCD, RFP, A/E contract or other pertinent project documents.
  - a. Guiding Principles Appendix C allows for certification through other Green Building Certification Systems. Note that many statutory and regulatory requirements are not included in the third-party systems and must still be met and documented.

*Projects that require both Guiding Principles and LEED Certification may find efficiency in employing GBCI's Guiding Principles certification service in addition to LEED certification. Additional resources can be found on GSA's [SFTool: Guiding Principles for Sustainable Federal Buildings](#).*
3. Buildings that are exempt from compliance with the GP:
  - a. are non-building assets; or
  - b. are leased; or

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<sup>7</sup> Includes joined transportables when over 5,000 square feet.

- c. slated for disposal (as a status indicator of report of excess [ROE] submitted or ROE accepted, Determination to Dispose, or Surplus; or
  - d. meet all these conditions:
    - i. Unoccupied: The building is occupied 1 hour or less per person per day on average
    - ii. Low/No Energy Use: Total usage from all sources is less than 12.7 kBtu/GSF/year
    - iii. Low/No Water Use: Consumption is less than 2 gal/day on average
- E. LEED BD+C: New buildings, additions, and modernizations over \$50M TEC**
- 1. New construction and building modernizations must meet U.S. Green Building Council's LEED v4 Gold or higher certification (including registration, submission of documentation, verification, and installation of plaque).<sup>8</sup> *Guidance: New construction and major renovations normally follow LEED BD+C; Refer to [www.usgbc.org](http://www.usgbc.org). LEED applies prerequisite and optional credits for the siting, design, construction, commissioning, and operation of new facilities and modernizations of existing facilities.*
  - 2. The design agency (Engineer of Record or Architectural and Engineering subcontractor), is responsible for registering, submitting documentation, and ensuring certification through [GBCI](http://www.usgbc.org) including costs related to registration and certification. Project management may establish different roles and responsibilities, and identify such in RCD, RFP, A/E Contract (Exhibit D) or other Project documents.
  - 3. LEED-Ineligible Projects
    - a. When the Federal Project Management Executive (PME) confirms LEED v4 Gold requirements cannot be met for a National Nuclear Security Administration (NNSA) capital asset project with a Total Project Cost of \$50M or greater, a LEED waiver process shall be implemented. The NNSA LEED waiver process is outlined [here](#) (Ch 14 references).
    - b. LEED certification depends on a project meeting LEED Minimum Program Requirements ([MPRs](#)).<sup>9</sup> Parking structures, exclusively process and power-generating buildings, and distribution systems are exempt. (Requirement 14-0002).
    - c. Major Renovations under LEED BD+C
      - i. If planned renovations are less than either (1) 50% of building's aggregate gross square footage<sup>10</sup> or (2) Total Estimated Cost (TEC) under 25% of the replacement value of the building, then the project is ineligible for LEED certification. (Requirement 14-0003).

<sup>8</sup> [DOE O 413.3B](#) Chgs 4–6. Also applies to multiple new, collocated buildings where combined project cost meets threshold. Can be LEED for New Construction, Campus, etc. See USGBC [Rating System Selection Guidance](#).

<sup>9</sup> For v4, MPRs include: minimum 1000 gross square footage; complete, permanent location on existing land, and other criteria.

<sup>10</sup> Projects not meeting this definition would be rejected by USGBC, who's 2010 Selection Guide defined **Major Renovation as:** "Includes extensive *alteration* work in addition to work on the *exterior shell* of the building and/or *primary structural components* and/or the core and peripheral MEP [mechanical/electrical/plumbing] and service systems and/or site work. Typically, the extent and nature of the work is such that the *primary function space* cannot be used for its intended purpose while the work is in progress and where a new certificate of occupancy is required before the work area can be reoccupied." Standards Program concurrence ensures consistent interpretation.

F. **Efficient Labs:** When adding fume hoods or constructing new lab spaces<sup>11</sup> follow energy efficient laboratory design principles when safe and LCC-effective. If judged not possible, or not LCC effective, a reduction in this requirement will be allowed through a formal process (e.g., Variance Form 2137). (Requirement 14-0004).

1. Such projects shall consider using the Labs21 Environmental Performance [Criteria](#) of International Institute of Sustainable Laboratories (I2SL) and the [Sustainable Strategies Checklist](#). *The criteria and checklist will assist in meeting the required energy efficiency metric for GP and 10 CFR 433 and includes these seven key elements:*
  - a. *Dynamic, direct-digital control systems,*
  - b. *Real time demand-based ventilation to control air changes per hour,*
  - c. *Efficient lighting (LEDs with occupancy sensors or timers),*
  - d. *Optimization or reduction of the exhaust fan discharge velocity (design study of exhaust dispersion based on site conditions),*
  - e. *Pressure drop optimization,*
  - f. *Fume hood flow optimization: apply AIHA/ANSI Z9.5 Standard to analyze if fume hood standby ventilation can be reduced,*
  - g. *Final commissioning and continuous commissioning with automated cross platform fault detection diagnostics. Guidance: Fault detection diagnostic software is managed by UI FOD and is easily achievable with a digital control system on the yellow network.*

*Refer to Lawrence Berkeley Lab's [Design Guide for Energy-Efficient Research Laboratories](#) for additional SD guidance.*

*In addition, LANL is an implementing partner of DOE's [Smart Lab Accelerator Program](#). The Smart Lab concept includes an integrated set of laboratory design criteria and performance standards that improves safety protocols and reduces energy consumption while offering continuous commissioning for real-time monitoring of facility conditions. The LANL Sustainability Program [web page](#) has more information and SME contacts.*

*[I2SL Best Practice Guides](#) (may have value for non-lab applications, too).*

G. **Green Purchasing/Environmentally Preferable Products (EPP)  
(Requirement 14-0005)**

*Sustainable acquisition, or "green purchasing," refers to purchasing products with specific environmental or energy attributes. The US Department of Energy (DOE), and therefore LANL and its subcontractors are required to purchase goods and services that can reduce environmental impact.*

1. To expedite green purchasing in facility related projects, several LANL Master Spec sections have been revised to specify EPP where appropriate; however, this may not address all potential products for every project, therefore, the project's design agency is responsible for the creation of appropriate project spec sections.

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<sup>11</sup> Refer to ASHRAE 90.1-2016 Section 6.5.7.3 for laboratory design requirements.



2. Refer to the listing of required EPP and recommended attributes in Attachment 1 of this chapter to guide in the incorporation of EPP products.<sup>12</sup> Additional resources are posted with the Chapter.
  3. Facility projects, both new construction and alterations, must purchase products with EPA, DOE, and USDA environmental or energy-attribute recommendations unless the product:
    - a. Is not available at a reasonable price (code "CU"),
    - b. Is not available competitively within a reasonable period ("DNI"), or
    - c. Does not meet the Laboratory's performance standards ("DNMS").
  4. The following categories of products are required:
    - a. [7 USC 8102](#) and FAR clause 52.223-2: The United States Department of Agriculture (USDA) designates certain biobased products for federal procurement and specifies minimum biobased content levels for those products. Designated products shall meet USDA BioPreferred's minimum biobased content level.
    - b. [42 USC 6962](#) and FAR clause 52.223-17: Under the Comprehensive Procurement Guidelines (CPG) program, the Environmental Protection Agency (EPA) designates products that are or can be made with recovered materials and recommends practices for buying these products. Any designated product shall meet the minimum recommended content levels as identified under the CPG program.
    - c. ENERGY STAR and FEMP-designated products per 10 CFR 436, Subpart C for all energy consuming products and services. See section B of this Chapter.
  5. Although not required by a statute or regulation, LANL encourages the LCC-effective use of construction products and building supplies recommended under [EPA's Recommendations of Specifications, Standards, and Ecolabels for Federal Purchasing](#), as appropriate and applicable. **When purchasing for a GP or LEED facility, low-emitting materials will be required.**
- H. **Zero Carbon Emission Ready Buildings:** Design new construction and modernization projects greater than 25,000 gross square feet to be net-zero emissions by 2030. (Requirement 14-0006)
1. Zero Carbon Emission Retrofit Design: When project will not achieve net-zero, it shall also provide future retrofit design at the conceptual (30%) maturity level. Plans shall be prepared and delivered separately from plans for initial construction and labeled as "Zero Carbon Retrofit." Whole building energy modeling shall be used to demonstrate that

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<sup>12</sup> Attachment 1 to the Chapter may be updated periodically by Ch 14 POC-only approval and without revision to chapter body based on changing guidance.

plans will achieve the goal; assume that LANL's electricity may not be zero emissions until 2032 or later.

2. Concerning initial project scope versus retrofit decisions, projects shall initially construct all design elements that:
  - a. are LCC effective; or
  - b. would cost considerably more to retrofit before 2030, than to install with initial construction (e.g., installing structure/floor space, conduit, and pull-boxes instead of doing renovations before 2030 to accommodate a future PV system); or
  - c. would cause the major renovation or demolition of portions of the building that have not yet reached their useful lifespan (for example demolition of a VAV system to retrofit to a VRF system by 2030).

*Guidance: Designs should focus on elimination of onsite fossil fuel use, and should include infrastructure such as electrical pull boxes, space planning for battery back-up, and structural planning for future installation and connection of carbon-emissions-free energy sources.*

#### I. Other SD Requirements

1. Provide **electric vehicle (EV) chargers** where dedicated Government Owned Vehicle (GOV) parking is part of the scope of the project. When non-GOV parking is part of the scope of the project, EV chargers may also be needed to fulfill requirements in Guiding Principles or LEED projects. (Requirement 14-0007)
2. Provide **meters** (building and sub-level) per Attachment 2, *Utility Metering Requirements*.
3. Install **cool roofs** for new construction or when replacing roofs unless determined uneconomical by a life-cycle cost analysis.<sup>13</sup> [Secretarial Memo of June 1, 2010]
4. Per **42 USC 6834**, install a **solar thermal system to supply 30% of the hot water load** in new buildings and major renovations, if LCC effective.<sup>14</sup>
  - a. Use the FEMP solar hot water calculator when performing initial simple payback analysis; use Albuquerque for nearest city. If simple payback period is greater than 24 years, solar water heating is not cost effective.
  - b. Follow IAPMO *Uniform Solar Energy Code (USEC)*, edition and amendments per ESM [Chapter 16](#) Section IBC-GEN Attachment A, *LANL Building Code*, when designing a solar thermal system.

Contact [site-sustainability@lanl.gov](mailto:site-sustainability@lanl.gov) for guidance which may preclude the need to calculate.

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<sup>13</sup> To be considered cool, a low-sloped roof (pitch less than or equal to 2:12) must be designed and installed with a minimum 3-year aged solar reflectance of 0.55 and a minimum 3-year aged thermal emittance of 0.75 in accordance with the Cool Roof Rating Council program, or with a minimum 3-year aged solar reflectance index (SRI) of 64 in accordance with ASTM Standard E1980-01. Steep-sloped roofs (pitch exceeding 2:12) must have a 3-year aged SRI of 29 or higher.

<sup>14</sup> Energy Independence and Security Act (EISA 2007) Section 523, through amendment of the Energy Conservation and Production Act, states, "if lifecycle cost-effective, as compared to other reasonably available technologies, not less than 30 percent of the hot water demand for each new Federal building or Federal building undergoing a major renovation be met through the installation and use of solar hot water heaters." Domestic hot water should not be the only considered load, but hot water used for the purpose of space heating should be considered as well. ESM Ch. 1 Z10 design goal references give a 24-year life for a heat exchanger.

5. Develop and follow a **Waste Minimization Plan**. Develop prior to construction start and follow throughout project. *Guidance: The goal is that constructor recycle or salvage at least 50 percent of construction, demolition and land clearing waste, excluding soil, where markets or on-site recycling opportunities exist. Architectural POC may have examples. **Guiding Principles and LEED Projects will have related requirements.***

## 2.0 ATTACHMENTS

Attachment 1, *Environmentally Preferable Products for Design Agency Created Specifications*

Attachment 2, *Utility Metering Requirements*

### REVISION RECORD

Rev	Date	Description	POC	OIC
0	2/9/04	Initial issue as ESM Ch. 1 Section Z10 App A, expanding SD material from Arch Chapter.	Tobin H. Oruch, <i>FWO-DO</i>	Gurinder Grewal, <i>FWO-DO</i>
1	6/9/04	Organizational and wording changes for clarity.	Tobin H. Oruch, <i>FWO-DO</i>	Gurinder Grewal, <i>FWO-DO</i>
2	5/18/05	Z10 App A became Ch. 14. Added waste min plan, IECC vice 90.1 option for GPPs, LEED for line items, other minor changes.	Tobin H. Oruch, <i>ENG-CE</i>	Gurinder Grewal, <i>ENG-CE</i>
3	10/27/06	Admin changes only. Org and contract reference updates. Doc number changes based on IMP 341. Other admin changes.	Tobin Oruch, <i>CENG</i>	Kirk Christensen, <i>CENG</i>
4	6/11/07	Added 30% better than ASHRAE 90.1-2004. LANL to pay LEED fees.	Tobin Oruch, <i>CENG</i>	Kirk Christensen, <i>CENG</i>
5	6/16/08	Revised to address changes in final 10CFR433, including additions, HVAC upgrades, plug load calcs, projects underway. Incorporated 430.2B requirements including LEED Gold and ENERGY STAR. Deleted PM 411 and other old reporting requirements.	Tobin Oruch, <i>CENG</i>	Kirk Christensen, <i>CENG</i>
6	8/25/10	Added IECC as minimum requirement for new buildings, additions, and alterations. Deleted 10CFR433/434 for process buildings. Noted \$5M LEED is TEC and deleted restriction to LEED-NC; delivery team to pay fees. Eliminated report for sub-LEED buildings.	Tobin Oruch, <i>CENG</i>	Larry Goen, <i>CENG</i>
7	4/5/11	Deleted 30% > ASHRAE for renovations; clarified HPSB requirement; for LEED, added off-ramps and clarified.	Tobin Oruch, <i>CENG</i>	Larry Goen, <i>CENG</i>
8	8/28/13	Updated LEED driver, criteria; ASHRAE 2007 or 2010 vice 2004. EPP requirements and Att. 1; other changes.	Tobin Oruch, <i>ES-DO</i>	Larry Goen, <i>ES-DO</i>
9	11/26/18	New summary table, 90.1 and/or IECC, invoked 10CFR433 directly, newer HPSB GPs, new LEED threshold, other changes.	Tobin Oruch, <i>ES-FE</i>	Larry Goen, <i>ES-DO</i>

<b>Rev</b>	<b>Date</b>	<b>Description</b>	<b>POC</b>	<b>OIC</b>
10	7/31/19	Aligned HPSB and LEED requirements to NNSA Federal Green Buildings Training, stressed Smart Labs, other minor changes throughout. Updated Attachment 1.	Tobin Oruch, <i>ES-FE</i>	Jim Streit, <i>ES-DO</i>
11	09/26/22	Adopted ASHRAE 90.1-2016 (and 2019 when mandated) to align with 2018 IECC. Mandated 2020 GPs. Added Zero Carbon Emissions Ready requirements per EO 14057. Added Attachment 2 on metering per VAR-10538. Added Definitions and Bases for Requirements; clarified requirements throughout, moved much guidance to references maintained on chapter webpage. Deleted references to specific versions. Added Requirements ID Log references and moved bases/footnotes to log (LANL internal-use log posted with chapter).	Dalinda Bangert, <i>UI-OSI</i>	Mike Richardson, <i>ES-DO</i>