

LANL Guide to Compliance with the HPSB 2016 Guiding Principles (GP) for Sustainable Federal Buildings for New Construction and Modernization* over 5,000 ft²

This guidance represents the LANL Sustainability Program's understanding of the intent of the GPs as presented by the DOE, FEMP, and other governmental agencies. It is the responsibility of the project team to demonstrate the project is meeting the intent of each GP as required by LANL Engineering Standards Manual [Chapter 14](#), Sustainable Design (SD). For additional assistance on SD and HPSB particularly, please contact the Sustainable Program at site-sustainability@lanl.gov.

Background

Per Executive Order 13693, the 2016 GPs were issued on February 26, 2016 by the White House Council on Environmental Quality, Office of Sustainability, in two documents: "Determining Compliance with the Guiding Principles for Sustainable Federal Buildings" (GP Compliance Document), which outlines evaluation criteria on which the Guiding Principles will be scored, and the "Guiding Principles for Sustainable Federal Buildings and Associated Instructions," which provides instructions, guidance and recommended practices.

All new, and modernized*, federally owned buildings over 5,000 ft², are required to meet the 2016 GPs for Sustainable Federal Buildings. The GPs direct new or renovation projects to consider and adopt, when appropriate, the following "green" building concepts: energy and water efficiency; protection of air and water quality; health and wellness of building occupants; facility durability and longevity; waste reduction; and environmentally friendly products. These best practices often overlap from one GP to the next. As examples: daylighting benefits wellness and lowers energy use; building shell water management reduces mold and air quality issues as well as creating a longer lasting buildings; environmentally friendly products can benefit the environment as well as wellness and energy efficiency. The project team should take note of these overlaps and create an integrated design.

Usage

This document corresponds with the Excel checklist created to track compliance and available from the Sustainable Program at site-sustainability@lanl.gov. While both documents suggest what may be submitted to show compliance, they are not meant to limit what a project may submit. Photos, pdf drawings, cut sheets, policies, written narratives or reports, are encouraged. At the request of the project team, a SharePoint folder can be created with access granted to the person(s) responsible for documenting compliance with the GPs. The project lead should email site-sustainability@lanl.gov to request access for the team members. Folders will correspond with each metric and any documents showing compliance may be saved there throughout the project design and construction. Alternatively the project team can email compliance documents to site-sustainability@lanl.gov as the project proceeds through design and construction.

While this is NOT the checklist used to track compliance, it follows a similar format. Notes shaded in blue-green offer guidance to achieve compliance. Notes shaded purple explain what might be submitted to show compliance. These are suggestions and not necessarily the only items needed nor the only way to show compliance.

To facilitate the earliest possible review by SMEs, submit the project in PRID as soon as possible. (Need a PRID refresher? Take UTrain #39035.)

IF the project is unoccupied AND has a projected energy use less than 12.7 kBtu/GSF/year—AND Low/No Water use—the project is exempt. OTHERWISE, request the checklist from site-sustainability@lanl.gov. The existing building checklist differs from the new buildings checklist. If working on a partial renovation project, please request the Guide to Existing Buildings.

For new construction, 20 out of 21 metrics below are required, and for modernization, 19 out of 21 metrics are required. For projects over \$50M, LEED Gold is required in addition to HPSB.

Guide to LANL HPSB Compliance

Life cycle cost analysis is required for all energy consuming systems; renewable energy generating systems; or when LCCE is selected as the reason any metric is partially compliant or not applicable. See Chapter 1, Section 10.B for HVAC equipment life.

***Modernization** is when an existing building undergoes a comprehensive replacement of all major systems, interior work, and building elements and features.

Metric Name	Required for New Construction	Required or Modernization	Metrics, further guidance, and best practices in green, and how to demonstrate compliance in purple.
Guiding Principle I. Employ Integrated Assessment, Operation, and Management Principles			
Integrated Assessment, Operation, and Management	RQD	RQD	1. Consider the environmental impact of siting decisions and use an integrated project team to: establish energy and other environmental performance goals in the design process; follow sustainable landscape design principles; evaluate electric vehicle charging needs; consider design choices that improve environmental performance, support health and wellness of building occupants and consider climate risks including wildfire; and consider all stages of the building's life cycle.
	<p>In the project planning phase, prepare an Integrated Project Team (IPT) Roster showing who will be involved in the design phase and who will be part of making the environmentally impactful decisions regarding: site selection, energy efficiency, water efficiency, metering, water quality, protection/storm water, materials selections, purchasing, operations and maintenance, indoor air quality (HVAC & exhaust), health and wellness of occupants, and climate change resiliency. Include a LANL Sustainability Program representative in the project team and, if applicable, a LEED Accredited Professional. The IPT should work to find synergy between GPs. For example: Modern, variable speed, air cooled chillers are considerably more efficient than cooling towers, and our climate is favorable for cooling with air economizers, so these chillers save both water and energy. Another example is occupancy sensors that can control lighting and HVAC, to save energy and optimize daylighting for occupant well-being.</p> <p>The A/E Team shall have relevant experience with cost effective environmentally sustainable design, energy modeling, and commissioning. Schedule an IPT design charrette with the team and use the Guiding Principles checklist (check boxes, use pull-down menus, make notes) to facilitate discussions about how to meet the required metrics. Sustainability does not have to be the only topic discussed, but sustainable goals should be discussed regularly throughout the project. A "simple box" energy model using orientation, envelope properties, etc., should be used as early as possible, either by the development team or by the A/E team, to verify that the design is on the right track to achieve the goals for energy and water use. Consider and document the need for electric vehicle charging infrastructure for employees or LANL fleet.</p> <p>During the design phase, review the checklist at every team meeting to track progress and fill in the checklist as design decisions are finalized or metrics are achieved. Throughout the project, document compliance with meeting minutes, ASHRAE 90.1 reports, life-cycle cost analysis, specifications, contract documents, construction drawings, etc.</p> <p>During Construction, the project team confirms and documents, in the checklist and with other records such as photos or test results, completion of the features that meet the design objectives and guiding principle metrics.</p>		
	Throughout the project, continue to address GPs and update any documentation. For example:		
	After the design charrette , save a copy of the IPT Roster, preliminary checklist, and narrative of the sustainability related decisions made during		

Guide to LANL HPSB Compliance

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			<p>the design charrette.</p> <p>During the design phase, submit an HPSB checklist to the sustainability program. The 60% design should incorporate all sustainable building features. If a Sustainability Program rep is not included on the IPT, email a GP Checklist to site-sustainability@lanl.gov at the 30% design phase.</p> <p>During Construction, route contractor submittals to the sustainability team as required, to ensure compliance. Also track items such as construction activity pollution prevention, indoor air quality management, sustainable building materials, and monthly construction demolition waste recycling.</p> <p>The Sustainability Program will be reviewing 30-60-90-100% design documents, as well as receiving submittals throughout the project. In this way some metrics will be verified before project completion. Obviously waiting until after project completion to collect and share the compliance documentation is difficult as information may be hard to locate. A regular check-in with the sustainability team member is beneficial to securing certification quickly and easily during project close-out.</p> <p>For information: See the DOE Guide “High Performance Sustainable Buildings” for Critical Decision timelines and deliverables.</p>
Commissioning	RQD	RQD	<p>2. Commission (and recommission at least every 4 years) to optimize building performance using commissioning agents who are independent of the design and construction or operating team.</p>
			<p>Project budget, schedule, and construction contracts must include money, time, and necessity for cooperation and coordination for the full commissioning process to run to completion. The Cx agent should be on the integrated team, whether LANL or subcontracted person. The A/E team will also be a member of the commissioning team to review and approve the plan, witness selected testing, provide design basis and design narratives documentation for the O&M Manual, among other responsibilities.</p> <p>To be compliant with the 4-year recommissioning, a building should install a BAS on the yellow network. In this way it will be part of a UI FOD continuous Cx. If a building installs a BAS on the red network, a plan for providing the energy and water use data to the UI FOD must be coordinated.</p> <p>Use ESM Chapter 15 as a top-level guide to Cx. Determine if Cx will be entirely by LANL, or a subcontractor, if LANL does not have qualified personnel. Commissioning should be consistent with the Federal Energy Management Program (FEMP) commissioning guidance: https://www.energy.gov/eere/femp/commissioning-federal-buildings. Submit the final Cx report with the GP checklist.</p> <p>If the existing building was commissioned no earlier than two years prior to taking credit, AND no major changes to mission/function, # people, or major facility upgrades since that time, then submit the previous Cx report and no action is needed until the 4-year recommissioning.</p>
			<p>Submit a copy of the construction schedule which includes commissioning activities. Submit a copy of the Cx report or for a recently commissioned existing property, submit the previous Cx report. Some portions of the Cx report may help to verify other GPs as well.</p>

Guiding Principle II. Optimize Energy Performance		
Energy Efficiency	RQD	3. A. Ensure energy efficiency is 30% better than the current ASHRAE 90.1 standard.
	<p>Consider using passive heating and cooling before engaging mechanical systems, harvest natural light and waste heat if possible. Next consider upgraded building envelopes and efficient equipment to reduce size of equipment needed. See Chapter 1, Section 10.B for HVAC equipment life-cycle cost requirements.</p> <p>Be sure the budget includes money for modeling, or the project team includes experienced energy modelers, and time for evaluating efficient design options. For guidance on energy modeling refer to ASHRAE 209 Energy Simulation-Aided Design Standard. The current ASHRAE 90.1 version, for this metric, is 2013 and the Performance Rating Method (PRM) must be used without plug and process loads. A total energy projection should still include the plug and process loads.</p> <p>If a 30% reduction is not life cycle cost effective (LCCE), the design of the proposed building or addition shall be as efficient as possible up to the point it is no longer life cycle cost effective. Analysis of different combinations of efficiency measures should be conducted to find the most efficient combination of measures which combine to create the greatest energy savings in a LCCE manner. Improving the building envelope is almost always LCCE. NOTE: efficient equipment or appliances which are required by 10CFR436 subpart C should not count toward the cost of efficiency measures because they are required by law: https://www.energy.gov/eere/femp/search-energy-efficient-products However their efficiency still counts toward the increased energy performance. On-site renewable energy systems also count toward the energy efficiency, so be sure to check the LCCE of these systems, especially for buildings with significant roof area available (or even south facing wall area, for thermal collection).</p>	
	<p>Submit copies of the Performance Rating Method reports showing the percentage better than ASHRAE 90.1-2013 and life cycle cost reports to support design decisions. These calculations are due at 30% review. The formula for calculating the performance is:</p>	
	$\% \text{ improvement} = 100 \times \frac{(\text{Baseline building consumption} - \text{plug \& process loads}) - (\text{Proposed building consumption} - \text{plug \& process loads})}{(\text{Baseline building consumption} - \text{plug \& process loads})}$	
	<p>Document the analysis for any energy efficiency choices that were deemed not to be LCCE.</p>	
	RQD	<p>3. B. For modernization, ensure:</p> <ol style="list-style-type: none"> 1) Energy use is 20% below the fiscal year (FY) 2015 energy use baseline, OR 2) Energy use is 30% below the FY 2003 energy use baseline, OR 3) The building has an ENERGY STAR® rating of 75 or higher, OR 4) For building types not in ENERGY STAR Portfolio Manager, where adequate benchmarking data exists, the building is in the top quartile of energy performance for its building type, OR 5) Energy efficiency is 30% better than the current ASHRAE 90.1 standard.

Energy Efficiency	<p>Before deciding upon a particular method of compliance, email site-sustainability@lanl.gov to determine if historic energy data will be available.</p> <p>1 & 2) Energy use baseline information can be used to show compliance compared to new usage. Use bills, metering results, consumption history and computer analysis to document the savings below 2003 or 2015 baselines. The GPs do not specify metrics, so use site total energy, weather normalized, etc., choose any that what work. HOWEVER, data will most likely not be available, so these options may not be viable.</p> <p>3) For building types that are in Portfolio Manager, data can be entered to show the building is achieving a rating of 75. Portfolio Manager data must be no more than 1 year old and for the full 12-month period. This option will be time-consuming for someone on the project team to track in Portfolio Manager. The year of data also means not proving compliance for one year after building is occupied.</p> <p>4 & 5) For other types of buildings, ASHRAE calculations (See 3A above) may be needed, or if other benchmarking data is available, this can be used to show how the building compares to others of that type. If other national labs have similar building types and they can share energy use data, this might be a reasonable way to show compliance.</p>		
	<p>1 & 2) Submit energy modeling analysis to show projected energy use vs. baseline.</p> <p>3) Submit a copy of the ENERGY STAR report showing the score of 75.</p> <p>4) Submit benchmarking data for the comparable buildings, and the energy modeling analysis to show the projected energy use vs. the benchmark baseline.</p> <p>5) Submit copies of the Performance Rating Method reports showing the percentage better than ASHRAE 90.1.</p>		
	RQD	RQD	3. C. Use energy efficient products.
	<p>10CFR436 subpart C requires the use of energy efficient products. Purchase ENERGY STAR or FEMP-designated products when life cycle cost effective, available, and meeting functional requirements for all covered product categories. See https://www.energy.gov/eere/femp/search-energy-efficient-products for updated covered products. And https://engstandards.lanl.gov/Ch14-and-Ch1-LCCA.shtml for LCCE information. Remember that these products do not count toward the costs of efficiency measures to meet GP 3A.</p>		
	<p>Submit project specifications, cut sheets, or contracts to demonstrate the purchase of qualifying products.</p> <p>Provide copies of the completed analysis for any energy efficient products in categories that were available but deemed not to be LCCE.</p>		
Renewable and Clean Energy	RQD	RQD	4. Evaluate and implement, where appropriate, life cycle cost-effective renewable energy projects on-site; consider long-term offsite renewable sources and RECs; and utilize clean and alternative energy where possible.
	<p>For new buildings, EISA 523 requires installation of a solar hot water system to provide at least 30% of the domestic hot water for the project, if LCCE. https://www.eere.energy.gov/femp/solar_hotwater_system/ These systems should be compared to other options to meet GP 3A. Before rejecting the idea of on-site PV, do a life cycle cost analysis, especially on buildings with significant roof area. UI may be able to provide the current price of our electricity for analysis, email site-sustainability@lanl.gov for information and assistance. If not able to do on-site renewable energy, consider offsite sources or Renewable Energy Credits. Preferable options are use renewable credits from another building that has more PV than it uses, or jointly locate PV with another project. If RECs are purchased, it must be for at least a 2 year contract to receive credit.</p>		
<p>Provide documentation of the LCC analysis or REC certificates stating length of contract and location of generation.</p>			

Guide to LANL HPSB Compliance

Metering	RQD	RQD	5. Install building level meters for electricity, natural gas, and steam; install advanced or standard meters as appropriate.														
	Data should be collected hourly for electricity, natural gas, and steam to track and report performance and assist in operations/maintenance. Follow LANL ESM and the Metering Program Administrator’s direction for appropriate meter types. Be aware that all utility tie-ins shall be approved by the U&I FOD, and can be refused if the improvement does not meet minimum LANL standards. Meters cannot be marked N/A or considered not LCCE in order to be considered compliant with this metric and metric 6 in a new building.																
	Provide a brief narrative of the metering strategy and drawings that locate meters. Also submit confirmation from UI's Metering Program Administrator that the meters are installed and communicating properly over the yellow net.																
Benchmarking	RQD	RQD	6. Benchmark building performance at least annually; regularly monitor building energy performance against historic performance data and peer buildings.														
	New buildings shall install Building Automation Systems which allows the UI BAS Team to use SkySpark for continuous building monitoring. Existing buildings should consider adding BAS if feasible. Meters cannot be marked N/A or considered not LCCE in order to be considered compliant with this metric and metric 5 in a new building.																
	A building connected to the yellow net and SkySpark for continuous building monitoring qualifies. If network connection is not feasible, then physical meters will be required for new facilities so that this information can be provided.																
Guiding Principle III. Protect and Conserve Water																	
Indoor Water Use	RQD	RQD	7. A. Build to ASHRAE standard 189.1-2014 sections 6.3.2, 6.4.2, and 6.4.3, or current comparable ASHRAE standards, AND B. Use water-efficient products; install building level water meters; optimize cooling tower operations; and eliminate single pass cooling.														
	ASHRAE 189.1-2014 was superseded by the IgCC (International Green Construction Code), so as an alternative, projects may meet the indoor water use requirements in the 2018 IgCC which address: plumbing fixtures, appliances, roofs, and HVAC systems.																
	Fixture Flow Rates from 189-1 are:																
	<table border="1"> <thead> <tr> <th>Fixture Type</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>Flushometer valve – single flush</td> <td>1.28 gallon/flush</td> </tr> <tr> <td>Flushometer – dual flush</td> <td>Not to exceed 1.28 gallon/flush</td> </tr> <tr> <td>Tank type water closet</td> <td>USEPA WaterSense Tank-Type High-Efficiency</td> </tr> <tr> <td>Urinals</td> <td>.5 gallon or USEPA WaterSense</td> </tr> <tr> <td>Public lavatory faucets</td> <td>.5 gallon per minute max.</td> </tr> <tr> <td>Dishwashers</td> <td>Maximum Water factor 3.8 gal/full operating cycle</td> </tr> </tbody> </table>			Fixture Type	Flow Rate	Flushometer valve – single flush	1.28 gallon/flush	Flushometer – dual flush	Not to exceed 1.28 gallon/flush	Tank type water closet	USEPA WaterSense Tank-Type High-Efficiency	Urinals	.5 gallon or USEPA WaterSense	Public lavatory faucets	.5 gallon per minute max.	Dishwashers	Maximum Water factor 3.8 gal/full operating cycle
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Designs should optimize cooling tower operations and may not use single pass cooling . In fact, cooling towers are only appropriate for new buildings if the cooling load is very large, on the order of 1000 tons or 500,000 SF of office space. Modern variable speed, air cooled chillers are considerably more efficient, and our climate is very favorable for cooling with air economizers.																	
Provide specifications, cut-sheets, photos, contracts, or construction drawings showing compliance with either standard. Submit confirmation from UI's Metering Program Administrator that the meters are installed and communicating properly over the yellow net.																	

Guide to LANL HPSB Compliance

Outdoor Water Use	RQD	RQD	<p>8. A. Separately meter water for irrigation systems greater than 25,000 square feet, AND B. Use water efficient landscapes, AND C. Limit potable water use for irrigation to 50% or more below conventional practices using methodologies from ASHRAE standard 189.1-2014 section 6.5.1 to calculate water use of conventional practices.</p>
	<p>The design should consider what budgets will be available, and the commitments for maintenance that will be made after the project is finished. The goal should be to create attractive and functional landscapes, some of which will require water (even a permanent drip or water-efficient spray system) to remain healthy and create quality environments for users. Consider where irrigation might be needed to create maintenance zones as described in ESM STD 341-100 Chapter 4 Section G2050 5.0 and IV.C.6 of the LANL Site + Architectural Design Principles. Where temporary irrigation is planned, use native and drought tolerant plants that, after establishment, can survive on available rainfall and are adapted in local growing conditions. Design any permanent irrigation with hydrozoning and install smart irrigation controllers, or ones certified by WaterSense.</p> <p>A. Either document that there is no irrigation system, or if the irrigated area will be more than 25,000 ft², install advanced meters connected to the BAS/SkySpark system. Consult UI's Metering Program Administrator for details about irrigation meter specifications.</p> <p>B. See Appendix B of the LANL Site + Architectural Design Principles document for plant and seed mix lists. If no permanent irrigation system will be installed, choose all dry, native and drought tolerant plants. Where a permanent irrigation system will be installed, choose at least 60% of the plantings as dry, native, and drought tolerant.</p> <p>C. Use a baseline water use for cool season turf (annual period or peak), to show 50% less water use as described above, AND if the landscape is over 25,000 ft², show compliance with the 2018 IgCC Section 601.3.1.2.1 - Irrigation System Design and 601.3.1.2.2 Controls.</p>		
	<p>Submit photos confirming installation of the meter and/or confirmation from UI's Metering Program Administrator that the meters are installed and communicating properly over the yellow net. Submit water use calculations, landscape plans, and plant lists that demonstrate that the designed/installed landscape will comply with C above, AND if the landscape is over 25,000 ft², show compliance with the 2018 IgCC Sections. For a modernization, document that either there is no irrigation, or show the list of existing plant materials to be drought tolerant.</p>		
Alternative Water	RQD	RQD	<p>9. Consider alternative sources of water where cost-effective and permitted by local laws and regulations.</p>
	<p>Consider alternative sources of water, such as gray water, rainwater, fire pump test water, condensate capture, discharge from processes, for landscape irrigation, toilet flushing, cooling water make-up or process uses. Conduct LCCE analysis to show feasibility. Consult New Mexico Environment Department for requirements: https://www.env.nm.gov/wp-content/uploads/sites/14/2017/08/2073NMACIntegratedapprovedAL-2014.pdf</p> <p>Submit a feasibility report investigating the possible sources and uses and submit life cycle cost analysis to support design decisions.</p>		

Guide to LANL HPSB Compliance

Stormwater Management	RQD	RQD	10. For new construction meet or exceed EISA section 438 storm water management requirements. For modernization, employ strategies that reduce storm water runoff and discharges of polluted water offsite to protect the natural hydrology and watershed health.
	EISA 438 requires establishing or maintaining pre-development (i.e. greenfield site) hydrology and managing runoff through Green Infrastructure/Low Impact Development methods. EISA 438 establishes two ways to meet design objectives: Option 1 is to design to capture 100% of a 95th percentile rainfall and Option 2 is site specific hydrologic analysis. For more general information: https://www.epa.gov/sites/production/files/2015-09/documents/eisa-438.pdf For LANL specific information see ESM, Ch. 3 G20. LANL has also developed a Storm Water Best Management Practices Manual and guidance on Low Impact Development (LID) controls: https://int.lanl.gov/environment/water/assets/docs/LA-UR-11-10371.pdf Also see https://int.lanl.gov/environment/water/storm-water/index.shtml Reduce impervious surfaces, add pervious paving materials, bio-swales, on-site filtration, rain water collection systems, or other methods to reduce storm water runoff from the site.		
	Submit a storm water plan, calculations, and a narrative to explain the following: measures implemented, soils analysis, constraints of the site, water flow calculations, volume of water managed by each BMP, and demonstration of compliance with ISA 438 requirements as specified in the LANL ESM. Include operations and maintenance requirements for a building maintenance manual.		
Guiding Principle IV. Enhance Indoor Environmental Quality			
Ventilation and Thermal Comfort	RQD	RQD	11. Meet the current ASHRAE 55 and either 62.1 or 62.2 standards for ventilation and thermal comfort.
	The current ASHRAE versions are: 55-2017 and 62.1-2016. 55 defines the acceptable temperatures and 62.1 defines the amount of fresh air exchanges needed for a healthy indoor environment. As an alternative, a building can meet the 2018 IgCC 801.3.1 Indoor Air Quality and 801.3.2 Thermal Environmental Conditions. In a new building, BAS will also be installed to monitor and offer controls to the heating, air conditioning, and ventilation systems. Consider installing a BAS system in existing buildings to comply with this and Cx requirements in GP I.		
	Submit documentation from the Engineer or Architect that shows compliance in the form of air flow calculations, heat loss/heat gain, and equipment sizing to show that the building will meet the requirements. An ENERGY STAR certification can also be used as documentation for an existing building, but this is time consuming for the project. This metric coordinates with commissioning in GP I. Ventilation schedules, balancing reports, and CO2 specs for equipment can be used as documentation for both GPs.		
Daylighting and Lighting Controls	RQD	RQD	12. Maximize opportunities for daylighting, automatic dimming controls or accessible manual controls, task lighting, and shade and glare control.
	For new buildings, orient on site to allow for passive solar heat gain and daylight distribution. Lighting strategies should include ambient daylighting, glare reduction strategies, task lighting at workspaces, and daylight sensors to turn off or dim electric lights. Comply with the following sections of the 2018 IgCC: 2018 IgCC Sections 801.3.7 Glare Control, 801.4.1 Daylighting, 801.4.1.2 Minimum Side Lighting Effective Aperture for Office Spaces and Classrooms, 801.4.1.3 Shading for Offices and/or 801.5.1 Daylight Simulation including 801.5.1.1 Minimum Daylight and 801.5.1.2 Excessive Sunlight. Existing buildings should assess if lighting sensors can/should be added, or if glare or excessive heat gain control is needed. Blinds, shades, exterior louvers, even trellis with deciduous vines can control excessive heat gain. Consider adding skylights if more daylighting is needed.		
	Document that these strategies were used or considered through a narrative of analysis, or show compliance with the appropriate sections of the 2018 IgCC with drawings, specifications, and daylight calculations.		

Guide to LANL HPSB Compliance

	For a modernization, document the lighting assessment and any mitigation strategies used. Use narratives, calculations, measurements, daylight modeling, etc. to demonstrate compliance.		
Indoor Air Quality	RQD	RQD	13. Develop and implement an indoor air quality policy that considers the following: moisture control, use of low emitting materials and products with low pollutant emissions, necessary protocols to protect indoor air quality during construction and in the finished building, prohibition of smoking in any form inside and within 25 feet of all building entrances, operable windows, and building ventilation intakes, and use of integrated pest management techniques.
	<p>While ongoing moisture control, in the form of humidity, in the building may not be an issue for NM, detailing for continuous air and water barriers is important to resilience and efficiency. Also plan to protect materials from water damage during construction to prevent future mold issues.</p> <p>Consider walk-off grates (interior or exterior) at entrances to prevent dirt and particulates from entering the building.</p> <p>Evaluate existing buildings for leaks and evidence of mold. Use building audits and commissioning reports to document. In existing buildings, protect the existing ductwork from dust/contamination during construction.</p> <p>Use low pollutant emitting products (e.g. low VOC, non-toxic, no or low formaldehyde products) whenever possible. BEES online is a great resource for life cycle assessment of products.</p> <p>Post signage about no-smoking policies at entrances.</p>		
	Document with a written plan, or a list of LANL policy numbers, to address each of the items as well as commissioning reports to show that the building met the desired outcomes. Document with photos of dust control measures. Document the specifications used and products selected.		
Occupant Health and Wellness	RQD	RQD	14. Promote opportunities for voluntary increased physical movement of building occupants such as making stairwells an option for circulation, active workstations, fitness centers and bicycle commuter facilities; and support convenient access to healthy dining options, potable water, daylight, plants, and exterior views.
	<p>Although LANL has food service options, fitness center, and trails available to staff, depending on the distance of the project site from these amenities, satellite areas, or new trails may be provided. Regardless of distance, a break room with a refrigerator, eating area, and sink should be provided. Provide a water bottle refill station if no space for a break room with sink. When selecting work station furniture, consider optional standing desks, standing mats, and active sitting chairs, for at least 50% of the stations, to allow movement while working. Install bicycle racks or lockers, and plan for easily accessible routes to existing trails and sidewalks. Design showers and/or changing areas in bathrooms, or combined with a lactation/wellness room, for easy mid-day or morning commute exercise. A lactation/wellness room should provide privacy in a lounge area with services such as a work surface and network connections.</p> <p>For new construction make stairways visible and consider using open stair wells between intermediate levels especially where work groups may benefit from frequent interaction. Open stairwells, which promote use over elevators, can also be used to daylight the interior of multiple levels. To document, consider 3rd party certifications such as Fitwel or Well Building Standard, or demonstrate compliance with photos, specifications, or other construction documents.</p>		

Guide to LANL HPSB Compliance

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Guiding Principle V. Reduce the Environmental Impact of Materials			
Material Content and Performance	RQD	RQD	15. Procure products that meet the following requirements where applicable: A. Resource Conservation and Recovery Act (RCRA) section 6002, AND B. Farm Security and Rural Investment Act (FSRIA) section 9002, AND C. Federally Recommended Specifications, Standards and Ecolabels or are on the Federal Green Procurement Compilation for other green products, as appropriate, AND D. Avoid ozone depleting compounds and high global warming potential (GWP) chemicals
	Carpet, acoustical tile, insulation, lubricants, landscaping materials, paints/coatings, and roofing are the most common product types that should be checked for compliance with these metrics. Compliance is required when the product in question: 1. is reasonably available in a reasonable time frame, 2. meets the performance standard, and 3. is available at a reasonable price (remember that all Guiding Principles are subject to life cycle cost effectiveness). See the Resources section of this document for websites relating to all of the following: A. RCRA created a federal purchasing policy for buying recycled content materials. Investigate recycled content products for construction, landscaping, parks & recreation equipment, and more. B. FSRIA 9002 created a mandatory bio-preferred purchasing program. Utilize products in categories such as construction, safety equipment, food service, grounds maintenance, and more. C. Specify and purchase products that have recommended labels, or use standard specifications and standards to guide in the selection of products. D. Manage refrigerants by avoiding substances that deplete the ozone or that have Global Warming Potential. Refer to ESM Chapter 6, Section D30, 3.1, C and the EPA websites in the resources section for more information. LANL approval of equipment should be obtained: https://int.lanl.gov/services/procurement/designated-procurement-representative/non-catalog.shtml		
	Consider a comprehensive purchasing specification or procurement policy document for the project that will meet several Guiding Principle metrics: ENERGY STAR, FEMP-designated, WaterSense, low emitting, recycled content, biobased content, environmentally preferable, and ozone-depleting compounds. All products shall adhere to Federal Acquisition Regulation Part 23 (FAR 23) for the purchase of products. Submit a list of compliant products for each product category and specifications, cut sheets, or the comprehensive document. Also list refrigerants used in HVAC equipment, ice machines, refrigerators, and ice/water machines.		
Waste Diversion	RQD	RQD	16. Where markets exist, provide reuse and recycling services for building occupants and divert at least 50% of non-hazardous non-construction related materials from landfills.
	Per DOE Order 436.1 and LANL policy P409, waste diversion is required at LANL. EPC-ES-GUIDE-016 provides resources for waste prevention. Individual projects only need to provide infrastructure for collection points in and at the building.		
	Document with a building and site plans showing interior and exterior collection points. If collection points are at a nearby building, supply a narrative explaining how far away those collection points are.		

Guide to LANL HPSB Compliance

Materials Management	RQD	RQD	17. Where markets exist, divert at least 50% of construction and demolition materials from landfills.
	The project must also comply with LANL Admin Procedure ADESH-AP-TOOL-704 Construction & Demolition. https://int.lanl.gov/environment/p2/recycle/construction-demolition.shtml Contact the FOD's Waste Management Coordinator: https://int.lanl.gov/environment/waste/waste_mgt/wmc.shtml Modular/pre-fabricated construction should employ recycling practices at the factory location.		
	Create a written policy for the project to describe all construction and demolition waste diversion expected for the project. Document either weight or volume of waste vs. weight or volume of recycled material, to get an accurate calculation. This should include waste and recycled material information from the factory of a modular/pre-fab building. Submit a written statement from the Waste Management Coordinator that states the site is free of any construction waste or debris.		
	Guiding Principle VI. Assess and Consider Climate Change Risks		
Mission Criticality	RQD	RQD	18. Determine long-term mission criticality of the physical asset and operations to be housed in the facility to inform the design of new construction and modernization to increase climate resilience.
	Conduct a vulnerability/risk assessment of risks due to climate change, the physical asset may face and how mission criticality might be impacted by those risks. Prioritize mitigation based on cost, mission criticality, and operations. Utilize and follow the U.S. Climate Resilience Toolkit framework or the NIST Community Resilience Planning Guide.		
	Document the risk assessment and strategy plan in a Climate Adaptation or Resilience Plan.		
Floodplain Considerations	RQD		19. Avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid floodplain development whenever there is a practicable alternative.
	During the site assessment process, confirm that the selected building footprint is not located in a floodplain. Document compliance with the National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 et seq., and the National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq. Alternatively, the project could comply with 2018 IgCC Section 501.3.1 Site Selection and 501.3.2 Predesign Site Inventory and Assessment.		
	Document compliance with site plans, maps, or written reports.		
Facility Design	RQD		20. Balance options to address predicted climate change impacts against mission criticality, cost, and security to determine design parameters; at a minimum, include low and no cost resilience measures to address predicted climate conditions.
	Prioritize strategies to ensure the planned building can resist or mitigate damage from reasonably expected natural disasters and weather events. Ensure the implementation of no cost and cost effective climate resilience measures, and where feasible, implement solutions which focus on operations as well.		
	Provide narrative describing low and no-cost resilience measures that mitigate climate change risks.		

Guide to LANL HPSB Compliance

Facility Adaptation	RQD	21. Take action to mitigate identified risks, considering mission criticality, climate impacts, cost, and phased adaptation over time.
	Conduct a risk assessment. Address any risks as possible within the scope of work and for which there is minimal cost. Create a phased adaptation plan to mitigate risks that are not addressed in this modernization if necessary. Utilize and follow the U.S. Climate Resilience Toolkit framework or the NIST Community Resilience Planning Guide.	
	Provide narrative describing the risk assessment and any design features to mitigate risks, a climate resilience plan, and copy of the phased adaptation plan.	

Resources	
General Information:	https://www.sustainability.gov/ http://www.energy.gov/eere/femp/articles/council-environmental-quality-issues-2016-guiding-principles-sustainable-federal https://www.energy.gov/eere/femp/guiding-principles-sustainable-federal-buildings https://www.gsa.gov/real-estate/real-estate-services/leasing-policy-procedures/green-lease-policies-and-procedures https://www.gsa.gov/about-us/organization/office-of-governmentwide-policy/office-of-federal-highperformance-buildings/policy/highperformance-building-certification-system-review LANL LCCA: https://engstandards.lanl.gov/esm/general/Ch1-Z10-AttE-R3.pdf and https://engstandards.lanl.gov/Ch14-and-Ch1-LCCA.shtml FEMP LCCA: https://www.energy.gov/eere/femp/building-life-cycle-cost-programs
3rd Party Certification	Green Building Initiative: https://www.thegbi.org/guiding-principles-compliance-certification/overview United State Green Building Council: https://guidingprinciples.gbci.org/
Training	https://www4.eere.energy.gov/femp/training/?keyword=Guiding%20Principle and https://go.usa.gov/xVW8P
Guiding Principle I: Employ Integrated Assessment, Operation, and Management Principles	Commissioning: https://www.energy.gov/sites/prod/files/2014/07/f17/commissioning_fed_facilities.pdf and https://go.usa.gov/xvqfA EISA Assessment: https://www.energy.gov/sites/prod/files/2016/09/f33/campus_eisa_assessments.pdf Building Commissioning Association: http://www.bcx.org/ https://energy.gov/eere/femp/search-efficient-technologies-and-products-federal-facilities
Guiding Principle II: Optimize Energy Performance	Energy Codes and link to COMcheck: www.energycodes.gov ASHRAE 90.1: https://www.ashrae.org/technical-resources/bookstore/standard-90-1 (The PRM is in Appendix G) ASHRAE 90.1 software tools: https://www.energy.gov/eere/buildings/qualified-software-calculating-commercial-building-tax-deductions equipment: https://energy.gov/eere/femp/search-efficient-technologies-and-products-federal-facilities renewable and alternative energy: https://maps.nrel.gov/femp/ and https://reopt.nrel.gov/projects/ and https://reopt.nrel.gov

Guide to LANL HPSB Compliance

	Metering: http://www.energy.gov/eere/femp/downloads/federal-building-metering-guidance-usc-8253e-metering-energy-use
Guiding Principle III: Protect and Conserve Water	WaterSense: https://www.epa.gov/watersense alternative water sources: https://www.energy.gov/eere/femp/best-management-practice-14-alternative-water-sources planning: http://energy.gov/eere/femp/water-efficiency-federal-buildings-and-campuses and https://www.energy.gov/eere/femp/developing-water-management-plan single pass cooling: http://energy.gov/eere/femp/best-management-practice-9-single-pass-cooling-equipment cooling tower management: http://energy.gov/eere/femp/best-management-practice-10-cooling-tower-management storm water: https://www.epa.gov/greeningepa/stormwater-management
Guiding Principle IV: Enhance Indoor Environmental Quality	ASHRAE: https://www.ashrae.org/ 2018 IgCC: https://shop.iccsafe.org/2018-international-green-construction-coder-igccr-1.html ENERGY STAR: https://www.energystar.gov/buildings/tools-and-resources/energy-star-guide-licensed-professionals daylighting: http://www.wbdg.org/resources/daylighting.php low emitting products: https://www.wbdg.org/resources/evaluating-and-selecting-green-products integrated pest management: https://www.epa.gov/ipm/introduction-integrated-pest-management indoor air quality: https://www.smacna.org/store/product/iaq-guidelines-for-occupied-buildings-under-construction
Guiding Principle V: Reduce the environmental Impact of Materials	Building for Environmental and Economic Sustainability software: https://www.nist.gov/services-resources/software/bees preferable products: https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program and https://www.epa.gov/rcra and http://www.epa.gov/epp/ ozone: https://www.epa.gov/ozone-layer-protection/ozone-depleting-substances and https://www.epa.gov/ghgemissions/understanding-global-warming-potentials and https://www.epa.gov/snap bio-preferred: https://www.biopreferred.gov/BioPreferred/faces/catalog/Catalog.xhtml https://www.epa.gov/greenerproducts/epas-recommendations-specifications-standards-and-ecolabels purchasing: https://www.epa.gov/saferchoice/products and https://sftool.gov/greenprocurement and https://www.epa.gov/greenerproducts/recommendations-specifications-standards-and-ecolabels-federal-purchasing WBDG, Green Specifications: www.wbdg.org/design/greenspec.php
Guiding Principle VI: Assess and Consider Climate Change Risks	https://toolkit.climate.gov/ https://www.nist.gov/topics/community-resilience/planning-guide https://www.epa.gov/greeningepa/facility-resiliency-epa https://trn.pnnl.gov/ and https://femp.energy.gov/resilience/