



P100 2021

The Facilities
Standards for the
Public Buildings
Service

This session is being recorded.

Training





Chapter 1 Sustainability

1

GENERAL REQUIREMENTS



Figure 4: Sydney R. Yates
Federal Building
Washington, DC

Lance Davis

Sustainability Architect



Walter Tersch

Sustainability Analyst





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01 General Sustainability

Getting to know sustainability in
P100





Sustainability

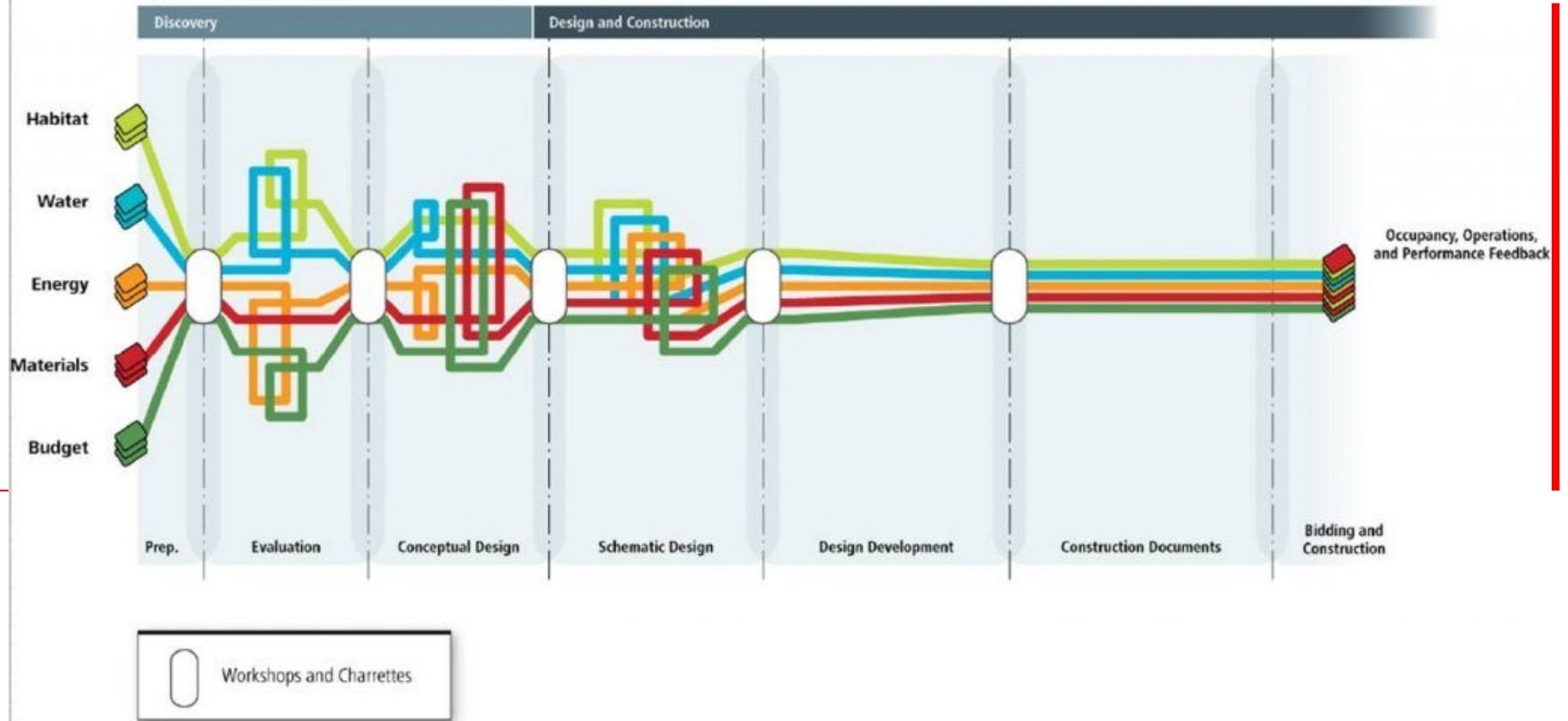
The condition under which humans and nature can exist in productive harmony...

...ensuring that future generations are not disadvantaged by the current generation.

Sustainable principles must be applied as appropriate to every project.

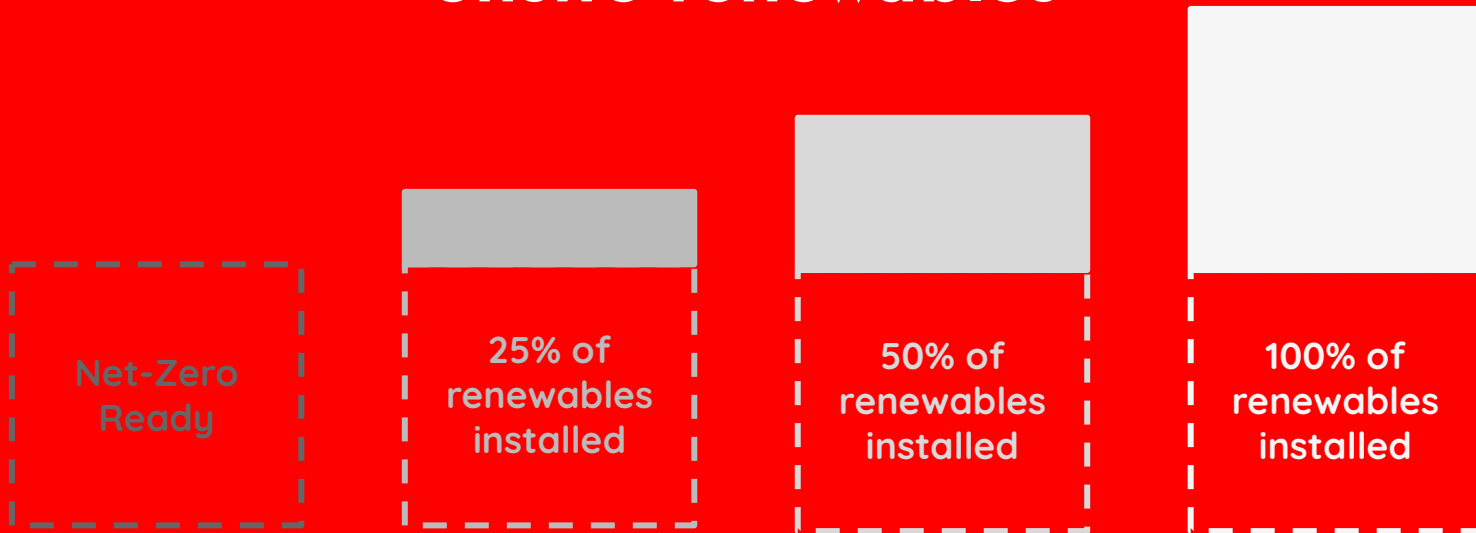
- Employ Integrated Design Principles
- Optimize Energy Performance
- Protect and Conserve Water
- Enhance the Indoor Environment
- Reduce the Environmental Impact of Materials
- Assess and Consider Building Resilience

Integrative Process



ENERGY NET-ZERO

Net-Zero on a source energy basis with onsite renewables



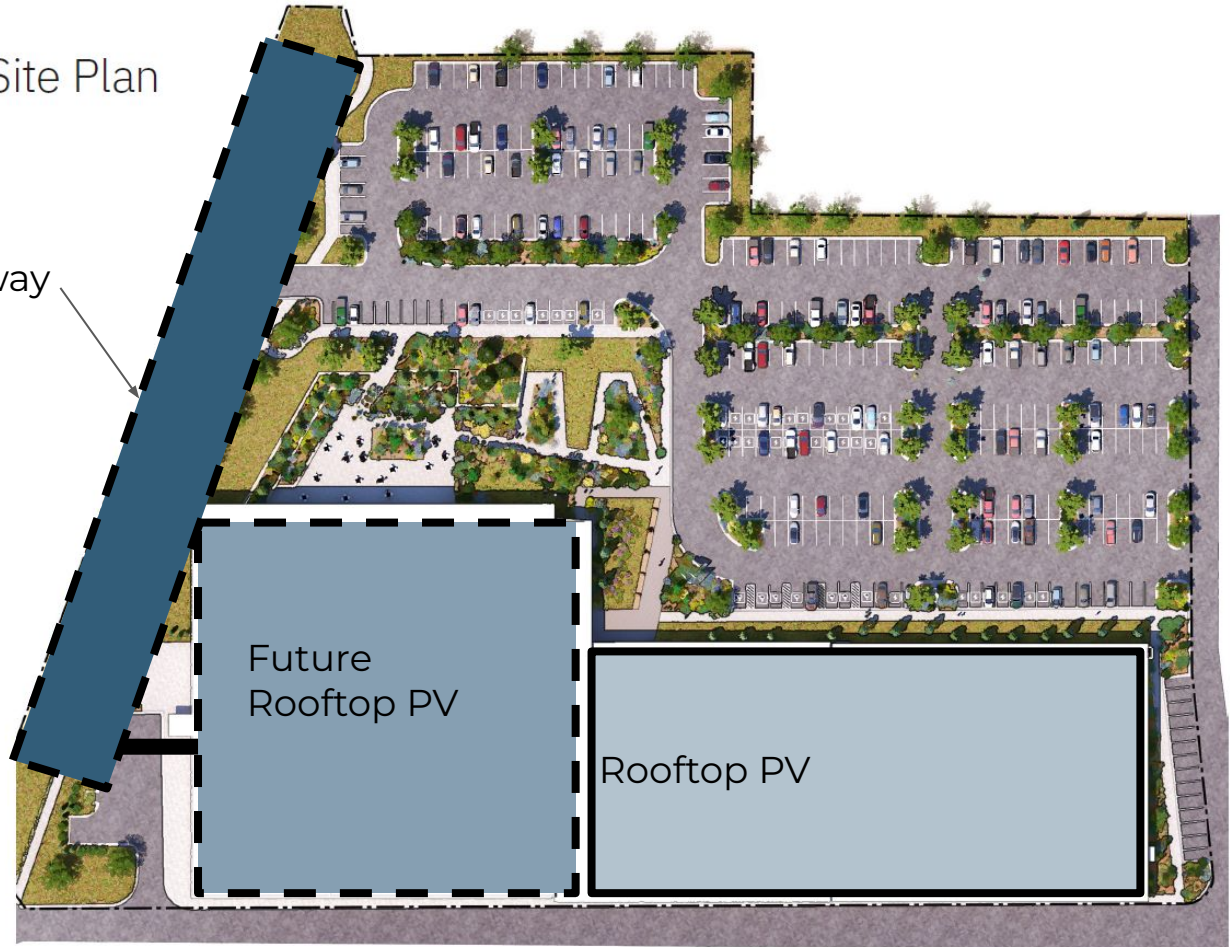
Energy Net Zero

Illustrative Site Plan

Future PV
with pathway

EUI=20 kBtu/GSF/year
Requires 161 panels @
2,490 kBtus/year/panel

Rooftop Pv=60 panels
Future Rooftop Pv=60 panels
Future PV=41 panels



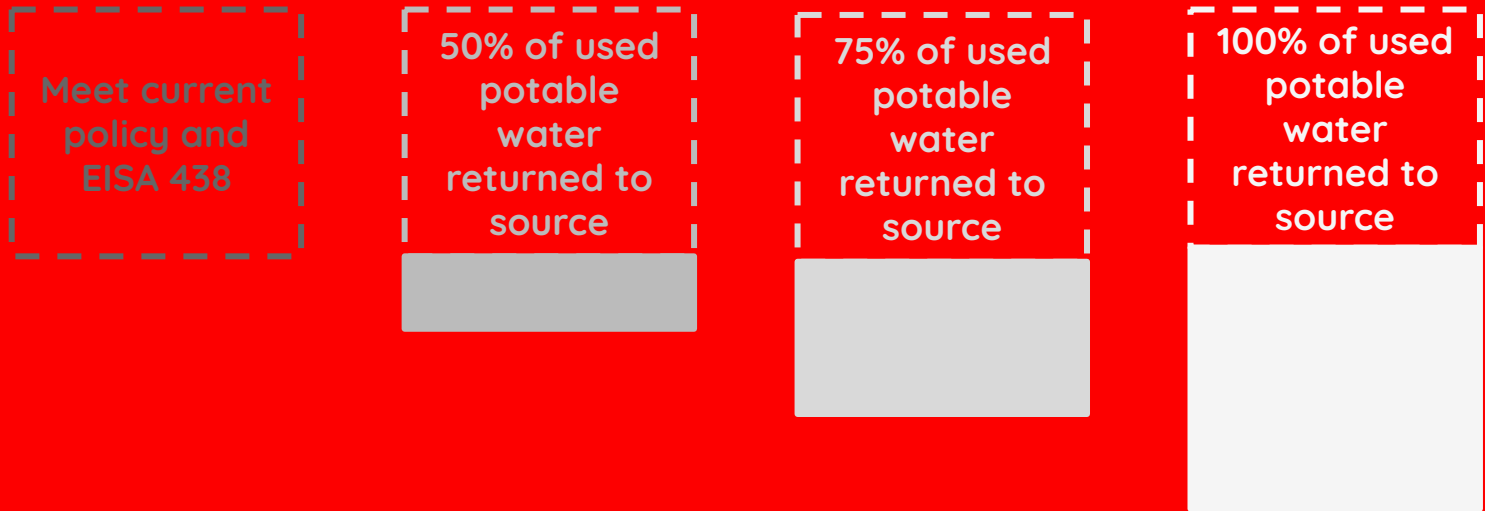
ZOOM IN
FOR DETAILS

0 30 60 120



WATER NET-ZERO

Potable water is cleaned and returned to its source onsite



GSA's Green Proving Ground

www.gsa.gov/gpg

048 NOVEMBER 2021 LIGHTWEIGHT QUAD-PANE WINDOWS

OPPORTUNITY

Windows are responsible for how much energy use?


34% OF COMMERCIAL BUILDING HVAC ENERGY IS LOST THROUGH WINDOWS¹
An improved building envelope minimizes HVAC loads and contributes to Net-Zero goals

TECHNOLOGY

How are Lightweight Quad-Pane Windows made?

4 PANES IN INSULATED FIBERGLASS FRAME WITH WARM-EDGE SPACERS & KRYPTON GAS

R-8 RATED FULL-FRAME INSULATING VALUE
2 configurations: 2 outer panes of low-e glass containing either 2 panes of thin glass or 2 layers of suspended film



M&V

Where did Measurement and Verification occur?

NATIONAL RENEWABLE ENERGY LABORATORY (NREL) assessed quad-pane windows provided by Alpen High Performance Products at the Denver Federal Center. One option used thin glass and one used suspended film.



02

2020 Guiding Principles

What changed

What's new in the 2020 Guiding Principles for Sustainable Federal Buildings

General and Integrated Design



- More alignment with industry standards, and more flexible compliance paths compared to the 2016 Guiding Principles
- Agencies may qualify buildings as meeting the Guiding Principles using third-party certification: LEED v4 BD+C or Green Globes for New Construction v2013



- Meeting relevant sections of the International Green Construction Code (IgCC) is now a compliance path for 2/3rds of the 30 Guiding Principles
- 1.1 Integrated Design: plan for “ability to accommodate temporary changes to normal operating conditions due to emergencies or significant events.”
- 1.2 Sustainable Siting: new, broad qualitative list of siting best practices was added. It includes “use historic properties, especially those located in central business districts[.]”



What's new in the 2020 Guiding Principles for Sustainable Federal Buildings

Energy and Water

- 3.1 Indoor water use: “implement water conservation technologies to the maximum extent that the technologies are life cycle cost-effective” (replaced “build to ASHRAE standard 189.1-2014” sections 6.3.2, 6.4.2, and 6.4.3)
- 3.3 Outdoor Water Use: can use irrigation with a 50% reduction versus conventional practice OR use xeriscaping [that requires little to no watering] and cease irrigation after plants are established (replaced reference to ASHRAE 189.1 baseline methodologies)



What's new in the 2020 Guiding Principles for Sustainable Federal Buildings

Enhance the Indoor Environment



- 4.2 Daylighting and Lighting Controls: adds references to views and reinforcing circadian rhythms
- 4.4 Radon Mitigation: new criterion requires testing and mitigation to maintain level at or below 4 pCi/L (picocuries/liter)
- 4.9 Occupant Health and Wellness: three compliance paths: complete section 2 of GSA's Total Workplace Scorecard; achieve certification using any Health & Wellness Standard and Rating System; or implement two health and wellness strategies (e.g. secure bike parking, fitness center, bottle filling stations, designing stairwells as a desirable option, or biophilic design with more connection to views, plants, outdoor access, daylight, etc.)



What's new in the 2020 Guiding Principles for Sustainable Federal Buildings

Materials, Resilience, and Section III "Meeting the Guiding Principles"



- 5.3 Products: now only references EPA recommendations, not Green Procurement Compilation

- 5.5 Hazardous Waste: new criterion for program or process to manage hazardous waste, if any is present in the building, in accordance with RCRA and CERCLA



- 6.1 Risk Assessment: new criterion requires a regionally-tailored risk assessment for the site
- Operational impacts (and Appendix D): clarifies requirements and timing for quadrennial Guiding Principles reassessment

←

→

03

2021 P100 Changes

Sustainability updates



LEED rating system

- LEED Gold for new construction and major R&A
- Other projects - discussion with CO **DURING** prospectus development



Waste Net Zero

- Develop a solid waste management plan
 - Show storage locations
 - Look for ways to divert waste
 - Show final collection areas
- **Ventilation for collection areas**

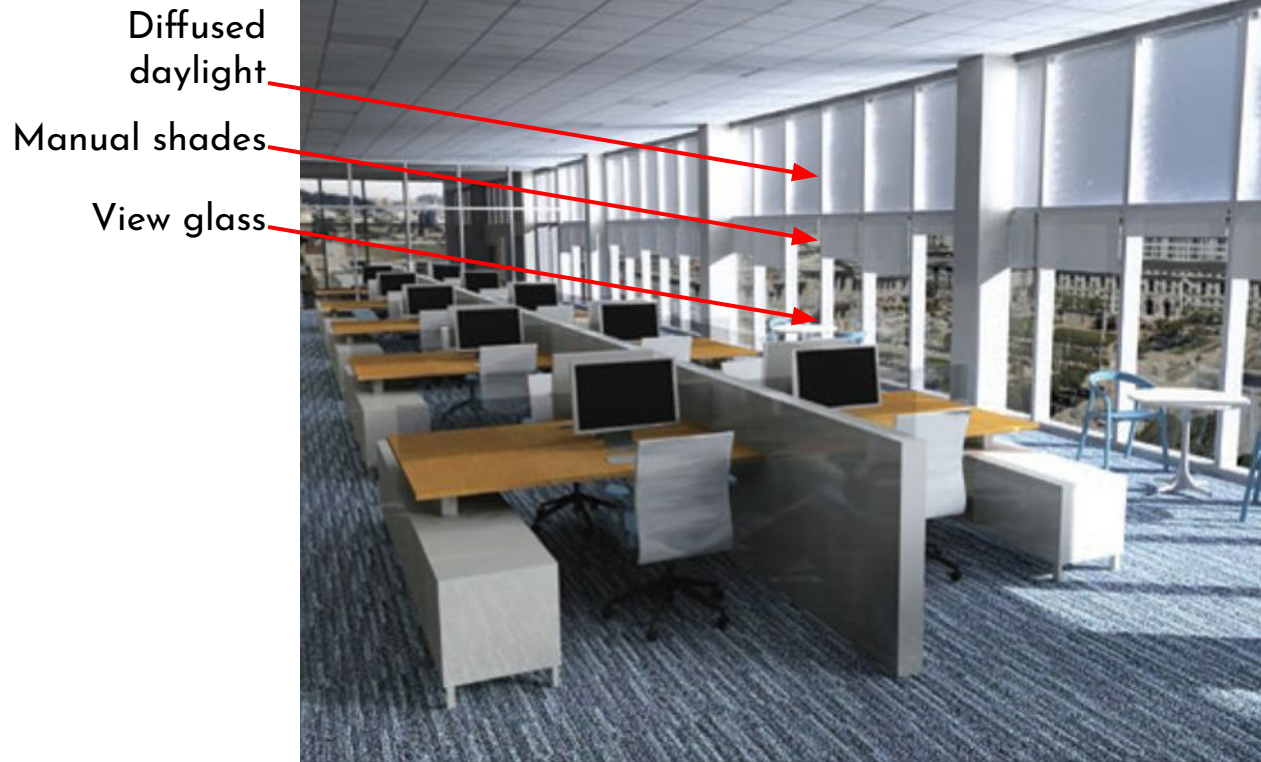


Daylight

Combined 6.2.1. Lighting Quality and other sections into one section.

Develop strategy to meet daylight and manage glare. Components are NOW part of the base building.

50% or more of floor area must have a line of sight to view fenestration from not more than 40'.



WHAT ARE GRID-INTERACTIVE EFFICIENT BUILDINGS (GEBs)?

- A GEB strategy enables the achievement of ambitious climate & resilience goals by bringing buildings & the grid together
- GEBs draw from a toolbox that includes energy efficiency, renewables, energy storage, and load flexibility
- GEBs employ these capabilities to flexibly reduce, shed, shift, modulate or generate electric load as needed
- In response to utility price signals, a GEB can reduce costs and enhance resilience for both building and utility

Why Should Feds Be Interested in GEBs?

- Meeting climate goals will require huge leaps in efficiency and integration
- Necessary to increase building and grid resilience

Opportunities for cost savings:

- ⌚ Demand response programs
- 🕒 Time of use rates
- 💰 Utility rebates and incentives
- 🏠 Efficiency savings
- 🏢 Reduce demand charges

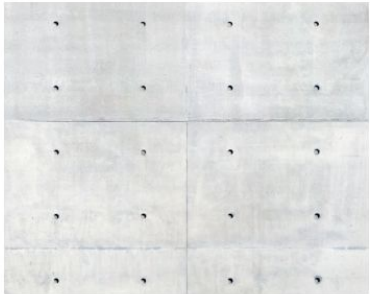


Decarbonization



HIGH-IMPACT MATERIALS

Predominant building materials with high-impact potential for emissions reductions



CONCRETE



STEEL



WOOD



CARPET



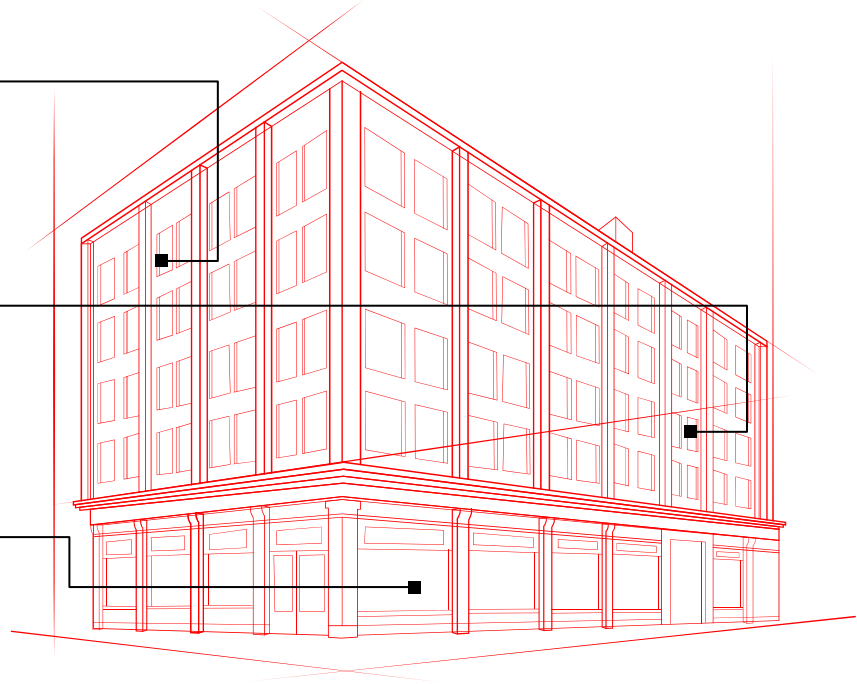
GYPSUM BOARD

Key Sustainable Products

- Nylon Carpet
- Interior Latex Paint

- Gypsum Board
- Acoustical Ceiling Tiles

- Concrete
 - Ready mix
 - Site mix

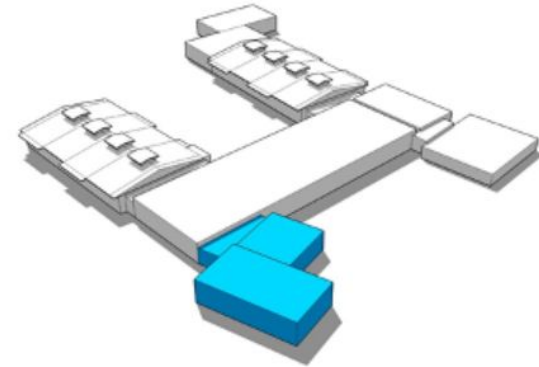
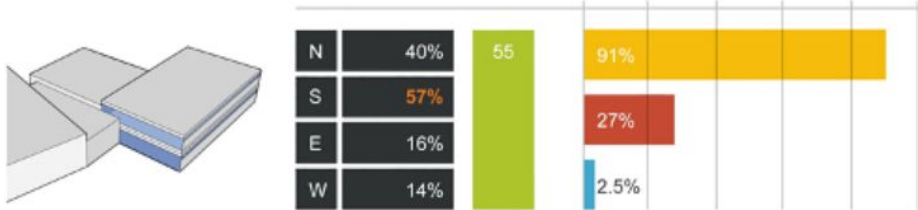




**Energy
Use Target
is now
required.**

Energy Models

Design Performance Modeling



- Energy Use Intensity
- Spatial Daylight Autonomy
- Annual Sunlight Exposure
- % Reduction in Heating Load
- Glazing Orientation



Management of Climate Related and Extreme Weather Risks

Historic climate data may not represent future conditions. GSA is integrating the observed and expected changes in climate.

- Get a climate profile
- Design for the service life
- Exercise professional judgment



Thermal Resilience

Designing for thermal
autonomy and passive
habitability



04

Sustainable Tools

Tools you can use

Project Title: [Click here to enter text.](#)

Location: [Click here to enter text.](#)

Current Phase: [Choose an item.](#)

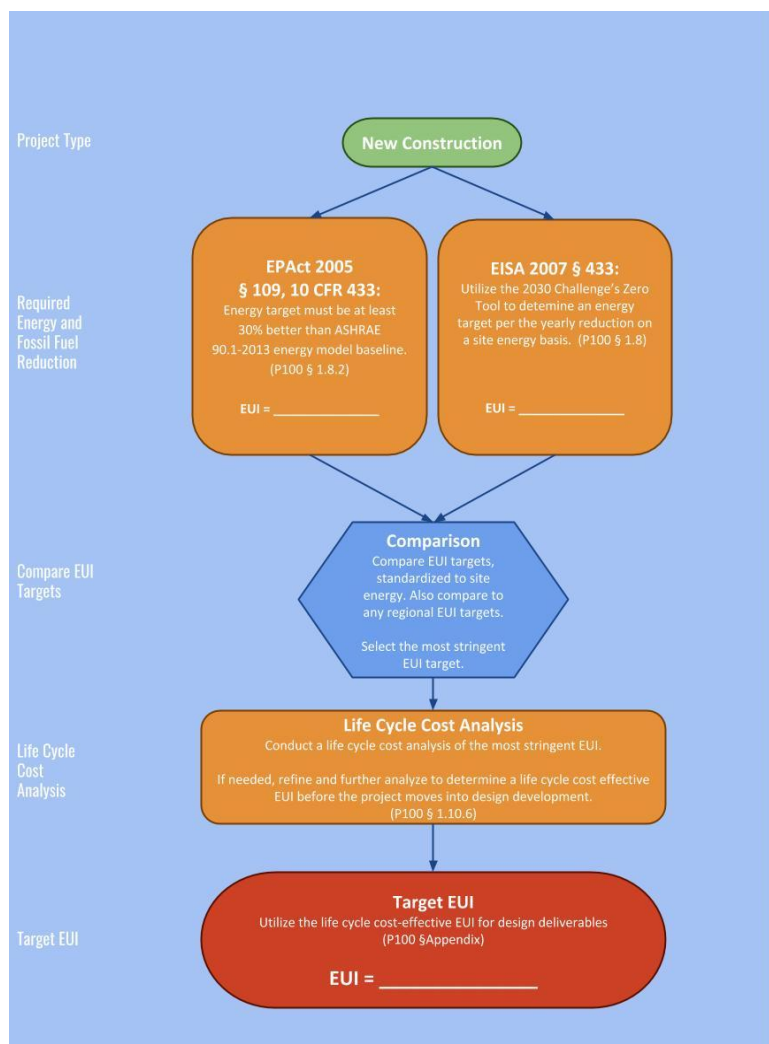
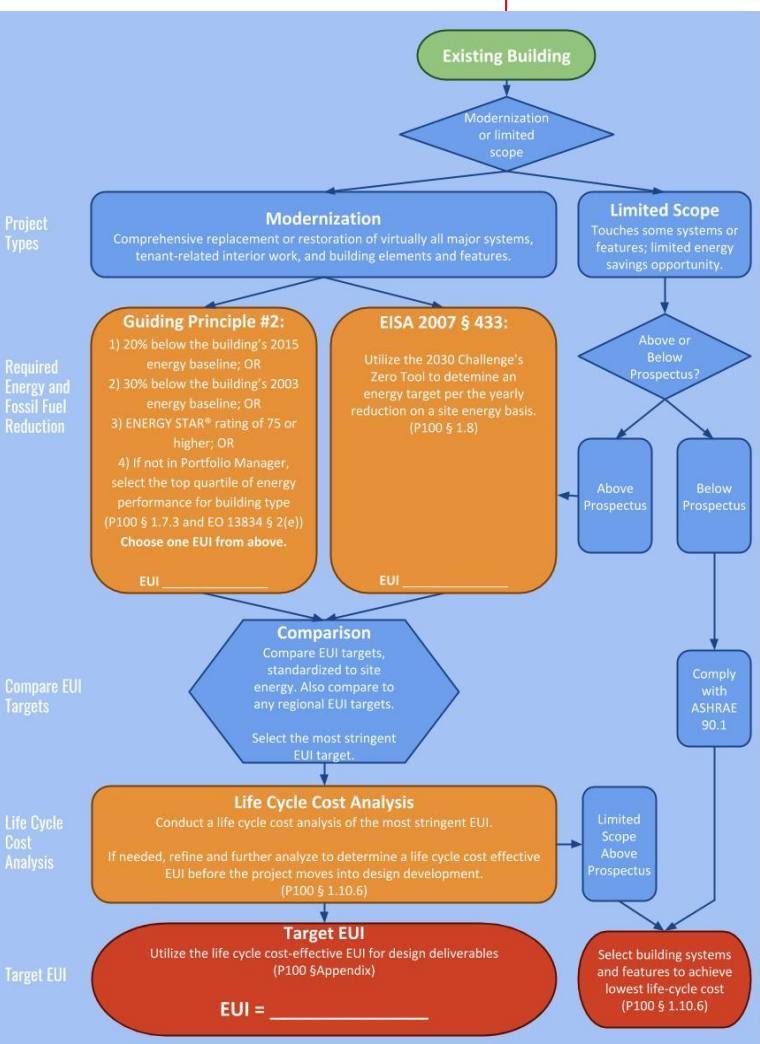
Date: [Click here to enter a date.](#)

Project Manager: [Click here to enter text.](#)



2018 P100 Performance Matrix	Place an X for each requirement					
Attribute	Baseline	Tier 1	Tier 2	Tier 3	N/A	Notes (Describe how design meets performance or any waivers from a requirement)
1.7.2 Sustainable Performance Requirements						
Energy						
Energy Net Zero						
Water						
Water Net Zero						
High Performance Building Technologies						
GSA Proving Ground						
Construction Personnel						
Green Credentialed						
2.1 Urban Planning and Public Use Performance Requirements						
2.2.1 Sustainable Locations						
Site Supports Neighborhood Connectivity, Walkability, and Transportation Access						

P100 Performance Matrix



Energy Use Target Guidance

ABOUT YOUR BUILDING

Building Name:

Country:

City | State/Prov.:

Postal Code:

Degree Days: HDD CDD

New construction Existing Building

BUILDING USE DETAILS

In order to provide you with an appropriate comparison for your building, we need to know how spaces in this building will be used. If your building has multiple uses, add them below.

Commercial Residential

Add Another Use:

Selected Use Type(s):

OFFICE

Use Default Values? delete

Gross Floor Area:

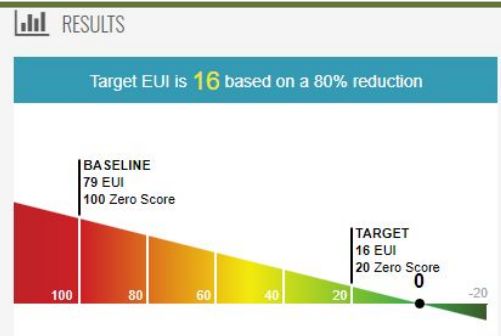
Number of Weekly Operating Hours:

Number of Workers on Main Shift:

Number of Computers:

Percent Heated:

Percent Cooled:



BUILDING SUMMARY

LOCATION: Edgewater, MD 21037
 USES: Office 35,000 sq.ft (100.0%)

RESULTS	BASELINE	TARGET	YOUR BUILDING
EUI % Reduction from Baseline	0%	80%	N/A
Zero Score	100	20	N/A
Site EUI (kBtu/ft ² /yr)	79	16	N/A
Source EUI (kBtu/ft ² /yr)	203	41	N/A
Total GHG Emissions (metric tons CO ₂ e/yr)	308	62	N/A

imperial metric print



Architecture 2030

A means to meet EISA 433
Includes the Zero Tool

This reference lists key sustainability requirements from 2021 P100, Executive Orders, laws, and GSA. An approved [Waiver](#) is needed for P100 requirements not met.

BASE REQUIREMENTS

Key Requirements Summary

Round-Up of P100 and Executive Order Sustainability Requirement for Project Managers

- LEED and SITES Certification.**
 - LEED v4 or [v4.1](#) BD+C Gold certification is required for all new construction (BA51) and major modernization projects (BA55/ comprehensive replacement or restoration of virtually all major systems, interior finishes, and building features). Limited scopes must achieve LEED rating identified by OCA during prospectus development. [P100 § 1.9.2.1](#)
 - Projects with sitework must achieve [SITES](#) Silver certification. Document and manage existing vegetation, and propose native perennial plants and pollinator-positive plants in landscape plans. P100 §§ 2.4, 2.5.2.4, 2.5.5, 2.5.6.
- Energy Efficiency.** Design for 30% higher efficiency than ASHRAE 90.1-2013 standard, and use 2030 Challenge [Zero Tool](#) to target 80% less fossil fuel-sourced energy than CBECs 2003 baseline. Choose the lower EUI between these two, per [Energy Target Guidance](#). P100 § 1.9.3
 - Rule of thumb: maximum energy usage intensity of 20 kBtus/GSF/year before renewables. Earning at least 15 LEED EA2 points demonstrates compliance.
 - Consider using energy savings performance contract (ESPC) or utility energy service contract (UESC) financing to fund energy/water/cost-saving work. [EO 14057 § 205\(c\)](#)
- Net Zero Energy Ready.** Show space on plan for renewables such as PV, solar thermal, or wind turbine(s), per [guidance](#). Design for future installation, including pathways, conduits, or other means of getting the power in the building, to facilitate later addition of onsite renewables sized to power the building. EO 14057 § 205(c) and P100 § 1.9.1.
 - Evaluate and implement lifecycle cost-effective onsite renewable energy projects, including solar thermal. [EISA 2007 § 523](#) and P100 § 5.4.4.
- Electrification and Net Zero Emissions.** EO 14057 §§ 205(a) and 205(c) and P100 § 1.9.3
 - New construction and major renovation projects must use all-electric equipment for HVAC, domestic water heating, and appliances. Fossil fuels may only be used to supplement electric-powered capacity: (a) during emergency backup situations; or (b) when low outdoor air temperatures prevent installed electric equipment from meeting the tenant's minimum indoor temperature.
 - GSA will centrally source 100% carbon pollution-free electricity for its owned real estate portfolio by 2025, mitigating equipment's greenhouse gas emissions. EO 14057 § 203
- Electric Vehicle Chargers.** Provide electric vehicle service equipment (EVSE) for government-owned vehicles, and conduit pathway infrastructure for personally-owned electric vehicles, per P100 § 6.5.7.8. EO 14057 § 204 and LEED Electric Vehicles credit.

GSA's Draft 2022 Sustainable Design Criteria (SDCs) for New Construction and Major Modernization Projects

Meeting all of these Sustainable Design Criteria (SDCs) qualifies a building as "sustainable" for Federal Real Property Portfolio reporting.

2021 GSA SDC #	Criteria Names	Sustainable Design Criteria (SDC) Language
I. Third-Party CERTIFICATION		
1	LEED	<p>Certify building as: LEED® v4 BD+C, at Silver level or higher.</p> <p>Upload LEED submittals and scorecards in GSA's Kahua project management software, and report certification details in Kahua> Sustainability> Goals> LEED.</p> <p>(Per P100 § 1.9.2.1: "all BA51 (new construction) and BA55 (major repairs and alterations that include work to a majority of the systems) must achieve, at a minimum, a Gold rating" through LEED version 4 BD+C or later.)</p> <p>Reference: - 2020 Guiding Principles for Sustainable Federal Buildings and Associated Instructions, Appendix C - Assessing a New Construction, Modernization, Major Renovation or Existing Building Using Third-Party Building Certification System: https://www.sustainable.gov/pdfs/guiding_principles_for_sustainable_federal_buildings.pdf</p>
II. Optimize ENERGY Performance		
2	Energy Efficient Products	<p>Specify and install Energy Star and FEMP-designated energy efficient products, e.g. windows, roof products, boilers, and appliances.</p> <p>(Per EISA 2007 § 323 [40 U.S.C. 3307(b)] and § 525 [42 U.S.C. 8259(b)(1)], EPCA 2005 § 104(a) [42 U.S.C. § 8259b], and FAR clause 52.223-15)</p> <p>References: - Energy Star Certified Products: https://www.energystar.gov/products - Energy-Efficient Product Categories: https://www.energy.gov/eere/femp/search-energy-efficient-products</p>
3	Energy Efficient Buildings	<p>(a) Earn at least fifteen (15) points within LEED credit EAc2 "Optimize Energy Performance" (which is 30% more efficient than ASHRAE 90.1-2013); OR (b) ensure that the project's energy performance target is at least 30% more efficient than ASHRAE 90.1-2013; OR (c) the project's energy performance target is the highest efficiency that is life cycle cost-effective, and meets ASHRAE 90.1-2013.</p> <p>(Per 10 CFR § 433.100 Energy Efficiency Standards, and P100 § 1.9.3 "Energy Use Targets")</p> <p>Reference: - GSA Energy Use Target Guidance: gsa.gov/sustainabledesign</p>
4	Energy Metering	<p>Earn LEED credit EAc3 "Advanced Energy Metering".</p> <p>This will ensure the project installs standard or advanced meters for natural gas and steam to the maximum extent practicable.</p> <p>(Per EISA 2007 § 434 [42 U.S.C. § 8253(e)] and P100 § 6.5.3.4 "Advanced Building Metering and Control")</p> <p>Reference: - Federal Energy Management Program Metering Guidance: https://www.energy.gov/eere/femp/downloads/federal-building-metering-guidance-usc-8253e-metering-energy-use</p>
		<p>(a) Earn at least one LEED EAc5 "Renewable Energy" credit by installing an onsite renewable energy system; OR (b) provide analysis showing that onsite renewable energy was evaluated (including solar thermal to meet 30% of building's anticipated hot water demand), and found not to be life cycle cost-effective.</p> <p>This will ensure that the project evaluates and implements life cycle cost-effective onsite renewable energy projects.</p> <p>(Per EISA 2007 § 523 [42 USC 6834 (a)(3)(A)(iii)], P100 § 1.7.2 "Sustainable Performance Requirements" and P100 § 5.4.4</p>

Sustainable Design Checklist

Leverages LEED certification
References Laws, Regulations, and P100



Project teams report using Kahua Sustainability App

P100 details how A/Es and PMs must report projects' sustainability scope info, goals, and Sustainable Design Checklist statuses

The screenshot displays the Kahua Sustainability App interface. At the top, the user is logged in as 'Su Sustainability' and the project is identified as 'AL - HUNTSVILLE - Huntsville New CT - New Huntsville AL Courthouse'. The main content area is titled 'Sustainability - 4 - AL0515ZZ - Huntsville New CT, AL' and features a navigation bar with tabs for 'Building Info', 'Scope', 'Goals', 'Compliance', 'Narratives', and 'Approvals'. The 'Compliance' tab is active, showing a text box with the following message: 'The Compliance tab applies to all New Construction and Major Modernization projects. These projects types must meet the Guiding Principles for Sustainable Federal Buildings.'

Below this is a 'DETAILS' section containing a table of compliance criteria. The table has four columns: '#', 'Criteria Name', 'Current Status', and 'Design Review Status'. The data is as follows:

#	Criteria Name	Current Status	Design Review Status
1	LEED	Implementation in progress	
2	Energy Efficient Products	N/A	
3	Energy Efficient Buildings	Implementation in progress	
4	Energy Metering	Implementation in progress	
5	Renewable Energy	N/A	
6	Cooling Towers	Planned but not started	
7	Stormwater Management	Planned but not started	
8	Material Content		
9	Resilience	Planned but not started	

At the bottom of the page, there is a 'Save' button. On the right side, a 'SECTIONS' sidebar lists various sections including '1. Building Info', '2. Scope', '3. Goals', '4. Compliance', '5. Narratives', and '6. Approvals'. The '4. Compliance' section is currently selected.

GSA Capital Project Sustainability Dashboard

Filter Project Type Filter BA Code



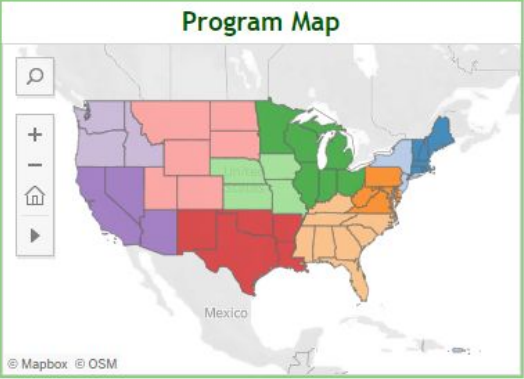
Small Project C&D Waste Diversion



Filter Energy & Water Graphs

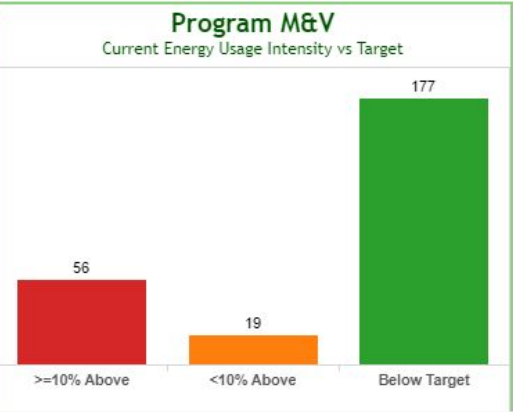
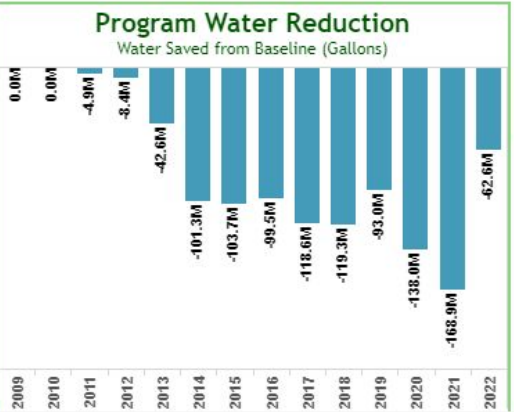
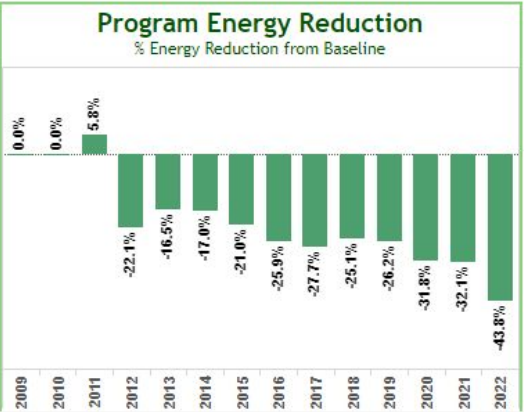
Baseline Year:

Select Region(s):



Program Scope Overview

	Advanced Metering	Building Envelope	Building Tune-Up	HVAC	IEQ	Lighting	Renewable	Water
1	31	33	12	72	12	58	13	19
2	31	41	35	95	21	78	13	33
3	27	42	15	76	13	82	7	14
4	83	80	41	140	57	107	11	47
5	57	69	43	163	29	144	7	38
6	25	21	34	92	14	55	5	13
7	24	86	40	136	19	130	28	45
8	18	59	28	120	21	124	10	25
9	53	56	32	135	28	134	25	64
10	31	28	22	94	17	42	5	9
11	42	67	38	114	35	102	15	41
T.	422	582	340	1,237	266	1,056	139	348



Thanks!

Do you have any questions?

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