

What's New with the GSA P100 Facility Standards

Version 2024

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Firm Overview

Interface Engineering is a progressive mechanical and electrical consultancy. Known for sensitive resource use, advanced building science tools, and commissioning services, we focus on innovative engineering solutions for high-performance projects, providing technical expertise through design, construction, and operations.

To serve our clients and our community, we create sustainable designs that not only perform beyond expectation, but also lead and inspire.



Our Services



Mechanical Engineering



Plumbing Design



Lighting + Daylighting



Building Technologies













Commissioning



Sustainable Design

From Zero Energy to Carbon Neutral and beyond.

At Interface, sustainability isn't a buzzword. It's fundamental to our engineering practice and culture. Consulting on overall integrated design, we help reduce demand on natural resources and find sustainable, efficient solutions.

Net result: long-term cost savings and less impact on the environment.

260 LEED, all levels

84 LEED Platinum

85

Zero (energy or water) buildings in design, under construction, ready, or built

17

Living Buildings in design, under construction or built

4

Carbon Neutral buildings in design, under construction or built

5

WELL Buildings in design, under construction or built

5

Green Globes projects in design, under construction or built

Licensed in 45 states

275 Professional Engineers, Designers, Analysts, Energy Modelers, and Administrative staff



Interface Offices







Course Description

The course was developed for design professionals in the field of architecture, engineering, and for leaders in the built environment that work with the GSA. The course focuses on the understanding and practical application of the mandatory design standards and performance criteria for GSA-owned buildings. Design and construction professionals must abide by the policy and technical criteria in P100 while programming, designing, and documenting GSA buildings.

The presentation not only clarifies the general requirements, but it will also take a deep dive into the updated sustainability requirements. Attendees will learn strategies and technologies to meet requirements by practical application through current design case studies.

The topic addresses carbon mitigation and energy efficiency for Health, Safety, Welfare.

Learning Objectives

- 1. Overview of the P100. Learn the intent, chapter topics, and performance level categories of the Standard.
- 2. Become familiar with changes to General Requirements regarding project applicability, documentation standards, and Designer of Record licensure requirements.
- 3. Gain a high-level understanding of the changes across all chapters with a deep dive into the updated Sustainability Requirements.
- 4. Attendees will learn strategies and technologies applied to recent projects to meet the P100 electrification and decarbonization requirements.

Agenda

- Introduction to P100 and Updating Process
- 02 General Applicability
- Governing Codes and Standards
- Requirements Performance-based and Prescriptive
- Organization Chapters and Overview of Changes
- Sustainability Requirements Major Changes
- Project Examples
- 08 Questions

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INTRODUCTION:

Overview

The U.S. General Services Administration (GSA) owns and leases over 363 million square feet of space in 8,937 buildings nationwide. (gsa.gov/real-estate/gsa-properties)

P100 is the Facilities Standards for the Public Buildings Service and establishes design standards and performance criteria for GSA-owned properties.

- P100 is Mandatory
- Not a guideline, textbook, handbook, manual, nor substitute for technical competence



P10C



FACILITIES STANDARDS FOR THE PUBLIC BUILDINGS SERVICE

May 2024



P100 Change Request Form

The General Services Administration is accepting change proposals to the latest version of P100, Facilities Standards for the Public Building Service. Much of P100 is written as performance requirements and proposed changes are preferred as performance based. The current P100, guidance and training can be found at this link www.gsa.gov/p100

All proposed changes to P100 will be submitted utilizing this form. Each proposed change will require a new form. You must complete all required sections to be able to submit the form. Fill in other sections as needed to make a complete and compelling case for the change. All submissions will be reviewed by the appropriate P100 Technical Committee and the P100 Steering Committee.

Change proposals for the 2024 P100 are closed, but we are collecting items for the 2027 P100. Additionally, we will review proposals if an addendum is necessary to reflect changes in legislation, executive order or significant changes in the industry.

Questions can be directed to the P100 Program Manager at p100@gsa.gov

Sign in to Google to save your progress. Learn more

* Indicates required question

INTRODUCTION:

Updating P100

Similar to other codes and standards, the P100 is on a three-year update schedule.

Year-long effort led by Lance Davis, P100 Program Manager, working with GSA Steering Committee, Green Building Advisory Committee and industry engagement to incorporate new developments.

Change proposals are accepted through submission of form available via link within the P100: <u>P100 Change Request Form</u> ${\sf A} {\sf P} {\sf P} {\sf L} {\sf I} {\sf C} {\sf A} {\sf B} {\sf I} {\sf L} {\sf I} {\sf T} {\sf Y} :$

P100 General

P100 2024 published May 31, 2024.

Required after August 1, 2024. Applies to owned inventory regardless of funding source (no change).

BA51	New Construction
BA54	Minor Repairs and Alterations
BA55	Major Repairs and Alterations
BA61	Operating Funds (incl. O&M Contracts)
BA63	Energy Rebates
BA64	Historic Preservation
BA80	Reimbursable Work Authorization
External financed	ESPC

- Applies to BA53 lease construction intended to own or option to purchase
- P100 is not retroactive



APPLICABILITY:

Facility Definitions

Essential:

IBC defines facility types to remain operational after an event (no change)

Critical Action:

DHS defines a slight change of flooding is too great. Updated floodplain management information.

Mission Critical:

Tenant defines if any operation is affected by electrical supply. Updated Federal Data Center Enhancement Act information. 03

GOVERNING CODES AND STANDARDS:

P100 General

- P100 must be used in conjunction with governing referenced standards.
- The latest published edition of national codes and standards in effect at the time of project solicitation applies.
- If conflicts exist between GSA requirements and GSAadopted codes or standards, GSA requirements takes precedence.
- All conflicts to be brought to the attention of the Regional Project Management Team (RPMT).



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P100 Structure

- X.1 Performance Tables
- X.2 Performance Attributes
- X.3 Prescriptive Requirements



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PERFORMANCE-BASED REQUIREMENTS:

5.1.9 HVAC Noise Control			
Performance			
Baseline	Comply with ASHRAE Applications Chapter 48, Table 1		
Tier 1	Comply with ASHRAE Applications Chapter 48, Table 1; Provide sound masking in open office spaces per P100		
Tier 2	Tier 1 AND Provide occupant indoor acoustical survey in the POE		
Tier 3	N/A		
M & V	Yes, Field Measurement of Sound Insulation in Buildings and GSA Workplace 20.20 testing protocol for speech privacy calculation in private offices (Tiers 1 & 2)		
Plans & Specs	Yes		
Calculations & Analysis	-		
References	ASHRAE Handbook – HVAC Applications, ASTM E336		
Basis of Design	List design RC level goals for all space types and describe how design will meet these goals		
Construction Verification	Verify space acoustic sound levels during TAB/Cx		

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PERFORMANCE ATTRIBUTES:

5.2.7 HVAC Noise Control

Acoustics in the workplace can affect productivity, and excessive noise can also cause physical symptoms. Crosstalk in open offices can also be a detriment to worker productivity. However, there is no evidence to suggest that these factors are improved with lower sound pressure levels. Hence requirements are to simply meet the industry standard Room Criteria (RC) levels per Chapter 3 Acoustics.



PRESCRIPTIVE REQUIREMENTS:

5.3 Mechanical Prescriptive Requirements

All mechanical and electrical equipment within the building or on the property must be in areas not subject to flooding. Refer to Chapter 4, Flood Resistant Design Requirements. Refer to the ISC for mechanical system requirements per the facility security level.

5.3.1 Design Criteria

Outdoor air design criteria must be based on weather data tabulated in the last edition of the ASHRAE Handbook of Fundamentals.

- Winter design conditions must be based on the 99.6% column dry bulb temperature.
- Summer design conditions for sensible heat load calculations must be based on the 0.4% column dry bulb temperature, with its mean coincident wet bulb temperature.
- Design conditions for the summer ventilation load, cooling tower selection, and all dehumidification load calculations must be based on the 0.4% dew point, with its mean coincident dry bulb temperature.

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ORGANIZATION:

Chapters

- **General Requirements** ٠
- Community Planning and Landscape Design .
- Architecture and Interior Design ٠
- Structural and Civil Engineering ٠
- Mechanical Engineering ٠
- **Electrical Engineering** ٠
- **Fire Protection** ٠
- Design Standards and Specialty Spaces
- Appendix





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Changes by Discipline

- Over **750** Change Proposals received
- Most included:
 - Clean up
 - Clarification
 - Updating standards

% in each discipline



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Chapters and Overview of Changes

- General Requirements Sustainability
- Community Planning and Landscape Design
- Architecture and Interior Design Enclosure performance
- Structural and Civil Engineering Licensure
- Mechanical Engineering Electrification, Smart Buildings
- Electrical Engineering Electrification, EVSE, Lighting
- Fire Protection
- Design Standards and Specialty Spaces
- Appendix





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Chapters and Overview of Changes

- General Requirements
- Community Planning and Landscape Design
- Architecture and Interior Design
- Structural and Civil Engineering Licensure
- Mechanical Engineering
- Electrical Engineering
- Fire Protection
- Design Standards and Specialty Spaces
- Appendix

Must be licensed in the State, District, or Territory of the project location



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Chapters and Overview of Changes

- General Requirements Sustainability
 - Net-zero definitions
 - Decarbonization Electrification
 - Water reuse
 - Decarbonization
 - Materials
 - Construction decarbonization
 - Contractor commitment
- Electrical Lighting, Power
- Design Standards and Specialty Spaces Electric Vehicle Supply Equipment (EVSE)



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SUSTAINABILITY REQUIREMENTS:

1.9: Summary of Changes



- 1.9.2.1 Energy Net-Zero New section
- 1.9.2.2 Water Net-Zero New section
- 1.9.2.3 GSA's Pilot to Portfolio Renamed and updated
- 1.9.3 Sustainability Requirements New section
- 1.9.3.1 Conservation, Efficiency, Renewables New section
- 1.9.3.3 LEED Certification Updated section with carbon free electricity
- 1.9.3.4 Decarbonization Updated section with new requirements
- 1.9.3.5 Electrification New section
- 1.9.3.6 Energy Usage Renamed and deleted 2030 Challenge for Carbon Neutral Buildings
- 1.9.3.6.3 Energy Model Updated to include future typical meteorological year
- 1.9.3.7 Life-Cycle Costing Clarified requirements and references Appendix A.6 LCCA
- 1.9.3.8 Grid-Interactive Efficient Buildings Updated section to a requirement

- 1.9.3.10 Sustainable Materials New section and deleted GSA Buy Clean Product Standards
- 1.9.3.10.1 Holistic Approach of Regenerative Materials – New section
- 1.9.3.10.2 Salvaged Materials New section
- 1.9.3.10.3 Low Embodied Carbon Concrete Moved from Structural and updated
- 1.9.3.10.4 Environmentally Preferable Asphalt Moved from Structural and updated
- 1.9.3.10.5 Sustainable Wood Responsible Sources – New section
- 1.9.3.10.6 Per- and Polyfluoroalkyl Substances (PFAS) – New section
- 1.9.3.11 Sustainable Construction New section
- 1.9.3.11.1 Construction Site Decarbonization New section
- 1.9.3.11.2 Off-Site Construction New section
- 1.9.3.11.3 Construction and Demolition Waste Updated references and included salvage
- 1.9.3.11.4 Green Credentialed Construction Personnel – Updated section to a requirement



Energy Net-Zero

1.9.1.1 Performance Table & 1.9.2.1 Performance Attributes

- **Baseline:** Energy Net-Zero Ready plan for and show renewables on plans.
- *Tier 1:* 25% Renewables with remainder designated on plan. At minimum comply with IgCC 7.4.1.1 On-Site Renewable Energy Systems, without Exception.

IgCC Table 7.4.1.1 Renewable Energy Requirement

Building Type	kBtu/ft² - yr
Office	14

- *Tier 2:* Tier 1 + 50% Renewables
- *Tier 3:* Tier 1 + 100% Renewables

Water Net-Zero

1.9.1.2 Performance Table &

1.9.2.2 Performance Attributes

- **Baseline**: New Construction must have 15% potable water reused or infiltrated on site. All projects meet EISA 438.
- Tier 1: New Construction increase to 40%; Major Modernization 15% water reuse or infiltration
- *Tier 2:* New Construction increase to 75%; Major Modernization increase to 40%
- *Tier 3*: New Construction increase to 100%; Major Modernization increase to 75%



GSA's Pilot to Portfolio

- 1.9.1.3 Performance Table &
- **1.9.2.3 Performance Attributes**
- Baseline: Two (2) Green Proving Ground (GPG)
 Pilot to Portfolio (P2P) Technologies.
- *Tier 1*: Four (4) GPG P2P Technologies
- *Tier 2:* Five (5) GPG P2P Technologies
- Tier 3: Six (6) GPG P2P Technologies

Center for Emerging Building Technologies | GSA

www.gsa.gov\gpg



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Electrification

1.9.3.5 Requirements

- Electrification Decision Flowchart (at right)
- No fossil fuel for HVAC, Domestic Hot Water (DHW), cooking, laundry and demand-response generators powered on-site.
- Emergency backup generators are excluded.
- HVAC and DHW electrification analyses of alternatives must include LCCA (Appendix A.6) and operational (scope 1 and 2) GHG emissions of each alternative.
- Alternative must include heat pump technologies.



Table 1.2 Electrification

Project Type Per Funding Code	BA51 New Construction and BA55 Repair and Alteration Projects	BA54 Minor Repairs and Alterations, BA61 Operating Funds, and BA63 Energy Rebate Projects	Other funding legislation or sources including BA80 Reimbursable Work Authorization and privately funded projects (e.g., ESPCs)
Electrification	Required	Required for any new or replacement HVAC or domestic water heating equipment. Optional but encouraged for repairs, cooking, laundry, and non- emergency backup generator equipment	Follow the electrification requirements for the project type (e.g., major R&A or limited scope) that aligns with funded scope

SUSTAINABILITY REQUIREMENTS:

Electrification

1.9.3.5.2 Exceptions:

Approved waiver required for:

- Fossil fuel-burning equipment where Table 1.2 requires electric
- Steam, hot water or chilled water from primarily fossil fuel source (on or off-site, or district)
- Equipment that is not the most life-cycle cost effective

Waiver must include:

- LCCA including at least one heat pump system option.
- Confirmation project will not exceed fossil-fuel energy consumption limits established in 10 CFR 433 Subpart B
- Clean Energy Rule: 90% on-site fossil fuel reduction starting FY2025 (CBECS 2003 baseline)

Materials

1.9.3.10 Requirements

Prioritize materials with:

- Long life span, are durable and low maintenance requirements
- Recycled content and/or are recyclable
- Ability to be uninstalled, disassembled, and relocated in a non-destructive manner at the end of first use
- Reduced transport emissions and cost due to local sourcing





Materials

1.9.3.10.1 Holistic Approach of Regenerative Materials

Evaluate materials and products that reduce negative embodied impacts and support:

- Human Health
- Social Health & Equity
- Ecosystem Health
- Climate Health
- Circular Economy

Materials

1.9.3.10.2 Salvaged Materials

Displacing new materials with reused, salvaged, reclaimed, repaired, refurbished or remanufactured materials greatly reduces embodied GHG.

- Explore partnerships with suppliers and contractors that embrace circular economy.
- Provide a salvage assessment for demolition projects. Revenue from recycling retained by the contractor and factored into their bids to reduce contract costs to GSA.





Materials

1.9.3.10.5 Sustainable Wood – Responsible Sources

- Documentation required that wood used in project meets ASTM D7612-21 (Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Source).
- Consider using tools like Nature, Economy and People Connected sourcing hub, where the country has scored 80 or higher. That is advanced by low ratings for both CITES (Convention on International Trade in Endangered Species) (a) Wild Fauna and Flora and (b) Protected Sites and Species Subcategories.

Materials

1.9.3.10.6 PFAS (Per- and Polyfluoroalkyl Substances)

PFAS chemicals regulated by EPA and state agencies as chemicals of special concern and hazardous substances under various statutes.

- Avoid specifying interior finishes, construction materials and products that contain regulated PFAS.
 - Require disclosure by suppliers (safety data sheets, product declarations, etc.)
- PFAS substances PROHIBITED in fire suppression systems, including handheld fire extinguishers.



COMMITMENT

CONTRACTOR'S COMMITMENT

to sustainable building practices

Version 2.0

In Effect 2023

SUSTAINABILITY REQUIREMENTS:

Sustainable Construction

1.9.3.11.1 and 1.9.3.11.2 Requirements

- 1.9.3.11.1 Construction Site Decarbonization: Contracts required to achieve GOOD level Building Green Sustainable Construction Leaders (SCL) Contractor's Commitment which includes:
 - Carbon
 - Jobsite Wellness
 - Waste Management
 - Water Management
 - Materials
- 1.9.3.11.2 Off-site Construction: Off-site construction encouraged to reduce waste, costs and community disruption.

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Electrical Engineering Updates

Lighting

- All interior lights shall meet Design Light Consortium (DLC) version 5.1
- All exterior Lights shall meet Luna 1.0
- In cases where luminaires do not meet DLC requirements (i.e. decorative fixtures) the lighting designer has to evaluate on a case-by-case basis
- Standardized Digital Protocol was introduced as DALI-2 (digital addressable lighting interface) and D4i (DALI for IoT)
- Power over the Internet (PoE) have been added to the lighting control section and is required to meet the following requirements:
 - Use red cable to for emergency lighting
 - Comply with UL924 where applicable for emergency lighting



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Electrical Engineering Updates

Lighting

- Use a different color for PoE lighting cable to be different from the IT cable
- Cable length limited to 328 feet
- Comply with IEEE 802.3bt class 8, 90W
- Comply with NEC article 725 and 840
- All luminaires shall be provided with dedicated drivers
- GSA IT must provide and maintain PoE switches
- Additional description has been added to 6.3.1.10 to indicate that luminaires installed in a drop ceilings will require additional support from building structure by chain, wire or threaded rods.





Electrical Engineering Updates

Power

- All 1200A and larger services will require a UL 1558 for service entrance Switchgear
- All switchgear and switchboards must have hinged covers in lieu of removable covers for safety purposes.
- Demand Load and Spare capacity was updated for " ..new components of the electrical system" to differentiate between existing installations and new installations.
 - For existing installation use the available spare/space capacity
 - For added new components provide the required Demand and Space per P100

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Electrical Engineering Updates

Power

- The following updates has been added to the Elevators and other Vertical Transportation Power
 - Critical control circuits in the elevator pits are position or otherwise protected from water intrusion during flooding or sprinkler activation.
 - Elevator controller must have a Short Circuit Current Rating (SCCR) which exceeds the calculated available fault
 - Shunt trip circuit breaker or current limiting fuses when sprinkler systems are present in the machine rooms or elevator shafts.





Electrical Engineering Updates

Generator

- The Switchgear for the 1200A or greater Emergency Power Supply System (EPSS) must be provided with IR camera ports on the enclosure, for easy inspection for thermal problems while under the load. All switchgear and switchboards panels must have covers in lieu of removable covers for safety purposes.
- Diesel is recommended for generators **500KW or larger**
- Load bank sizing has been modified
 - **20%** of the generator size for the natural gas generators
 - **50%** of the generator size for the diesel generators

8.5: Electric Vehicle Supply Equipment New Section

2022 P100 included EVSE requirements in Chapter 6 – Electrical.

- 2024 P100 6.5.9.8 Electrical Vehicle Supply Equipment (EVSE) references Chapter 8 for requirements.
 - 8.5.1 EV Charging
 - 8.5.2 Government Owned Vehicle (GOV)
 Requirements
 - 8.5.3 Privately Owned Vehicle (POV) Requirements
 - 8.5.4 EVSE Infrastructure
 - 8.5.5 EVSE Accessible Charging Requirements
 - 8.5.6 EVSE Fire Protection

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ON STANDARDS FOR SPECIALTY SPACE

8.5: Electric Vehicle Supply Equipment

EV Chargers required for government-owned vehicles (GOV/federal fleet) for any project modifying or installing parking lots or garages, including resurfacing.

- Installation locations by order of preference:
 - Outside surface parking areas
 - Roof level of parking structure
 - All other parking structure locations

Electric Vehicle Charging

Table 8.2 Requirements				
Charger Quantities, Based on GOV Fleet Program Requirements				
Baseline	1 charging port for every 2 GOVs with 1 accessible charging facility			
Tier 1	1 charging port for every 1 GOV with 1 accessible charging facility			
Tier 2	> 1:1 ratio to allow for visiting EV charging with 1 accessible charging facility			
Tier 3	3:1 (task to immediate surround); 10:1 (non-work areas)			
Charger Types, Based on GOV Fleet Program Requirements				
Baseline	Mid Power AC Level 2 Charger: Minimum 6.6 kW at 208v or 7.2 kW at 240v			
Tier 1	High Power AC Level 2 Charger: 8.0 kW – 20.0 kW range			
Tier 2	Direct-Current Fast Charger (DCFC): Uses a 3-phase AC electric circuit but delivers current (DC) to the vehicle			
M & V	N/A			
Plans & Specs	Yes			
Calculations & Analysis	Provide analysis on quantity and capacity of chargers selected and how they relate to vehicle predicted usage patterns or tenant policy. Note: For Level 2 and Level 3 Chargers, provide an accessible charging facility for each level of charging in one charging station			
References	UL 1741, UL 2202, UL 2594, UL 9540			
Basis of Design	Describe EV charging system requirements and how power sharing and/or charge management will be incorporated			
Construction Verification Verify charge management controls for each charger				

Resources

P100 and training videos are available online:

Facilities Standards (P100) overview | GSA

2024 P100 General Requirements/LCCA/BIM 2024 P100 General Requirements/LCCA/BIM Slides [PDF - 4 MB] 2024 P100 Sustainability Training 2024 P100 Sustainability Training Slides [PDF - 10 MB] 2024 P100 Building Enclosure Training 2024 P100 Building Enclosure Training Slides [PDF - 7 MB] 2024 P100 Mechanical Engineering Training 2024 P100 Mechanical Engineering Training Slides [PDF - 4 MB] 2024 P100 Electrical/EVSE Training 2024 P100 Electrical/EVSE Training Slides [PDF - 4 MB] 2024 P100 Architecture, Interior Design & Accessibility Training 2024 P100 Architecture, Interior Design & Accessibility Training Slides [PDF - 4 MB] 2024 P100 Structural and Civil Training 2024 P100 Structural and Civil Training Slides [PDF - 3 MB] 2024 P100 Community Planning and Landscape Training 2024 P100 Community Planning and Landscape Training Slides [PDF - 16 MB] 2024 P100 Fire Protection Training 2024 P100 Fire Protection Training Slides [PDF - 2 MB] 2024 P100 Getting to Know P100 Public Training Slides [PDF - 29 MB] 2024 P100 Getting to Know P100 Public Training Q&A [PDF - 75 KB]

For more information, contact Lance Davis (lance.davis@gsa.gov).

07

PROJECT EXAMPLE 1:

ESPC - Electrification

Building Heating & Domestic Hot Water

- Existing Historic Building in DC served by GSA district steam for building heating and domestic hot water
- ESPC for Deep Energy Retrofit:
 - Improve energy efficiency
 - Electrify central plant equipment
 - Building HVAC equipment remains
 - Occupied building

ESPC - Electrification

Building Heating and Domestic Hot Water

Existing Conditions

District Steam



Steam-to-Hot Water Converter Building Heating Loop (180°F - 160°F)

Domestic Hot Water:

- Steam-to-Hot Water
 Converter
- Distributed Electric Heaters with Storage Tanks

ESPC - Electrification



with Storage Tanks

ESPC - Electrification

Building Heating and Domestic Hot Water



ESPC - Electrification

Building Heating and Domestic Hot Water

Lesson Learned:

- Electrical power
 - Increased overall load
 - New distribution needed to deliver power to outdoor equipment
- Heat pump equipment operation
 - High temp hot water to existing systems required AWHP to regulate source loop temperature
 - Existing systems remain operational required additive system approach



ESPC – PV, Battery Storage & EV Chargers

- Campus comprised of multiple existing buildings, some listed on Historic Register
- ESPC for:
 - Solar PV canopies and roof
 - Battery energy storage system
 - EV charging stations



ESPC – PV, Battery Storage & EV Chargers





ESPC – PV, Battery Storage & EV Chargers



ESPC – PV, Battery Storage & EV Chargers

ESPC – PV, Battery Storage & EV Chargers

Campus Microgrid

Lesson Learned:

- Existing submetering data: peak power loads, peak demand
- Existing distribution system: infrastructure diagrams well documented and up to date
- Spare capacity within the system



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Questions?

American Geophysical Union Headquarters

ZERO ENERGY, LEED PLATINUM

Washington, DC



