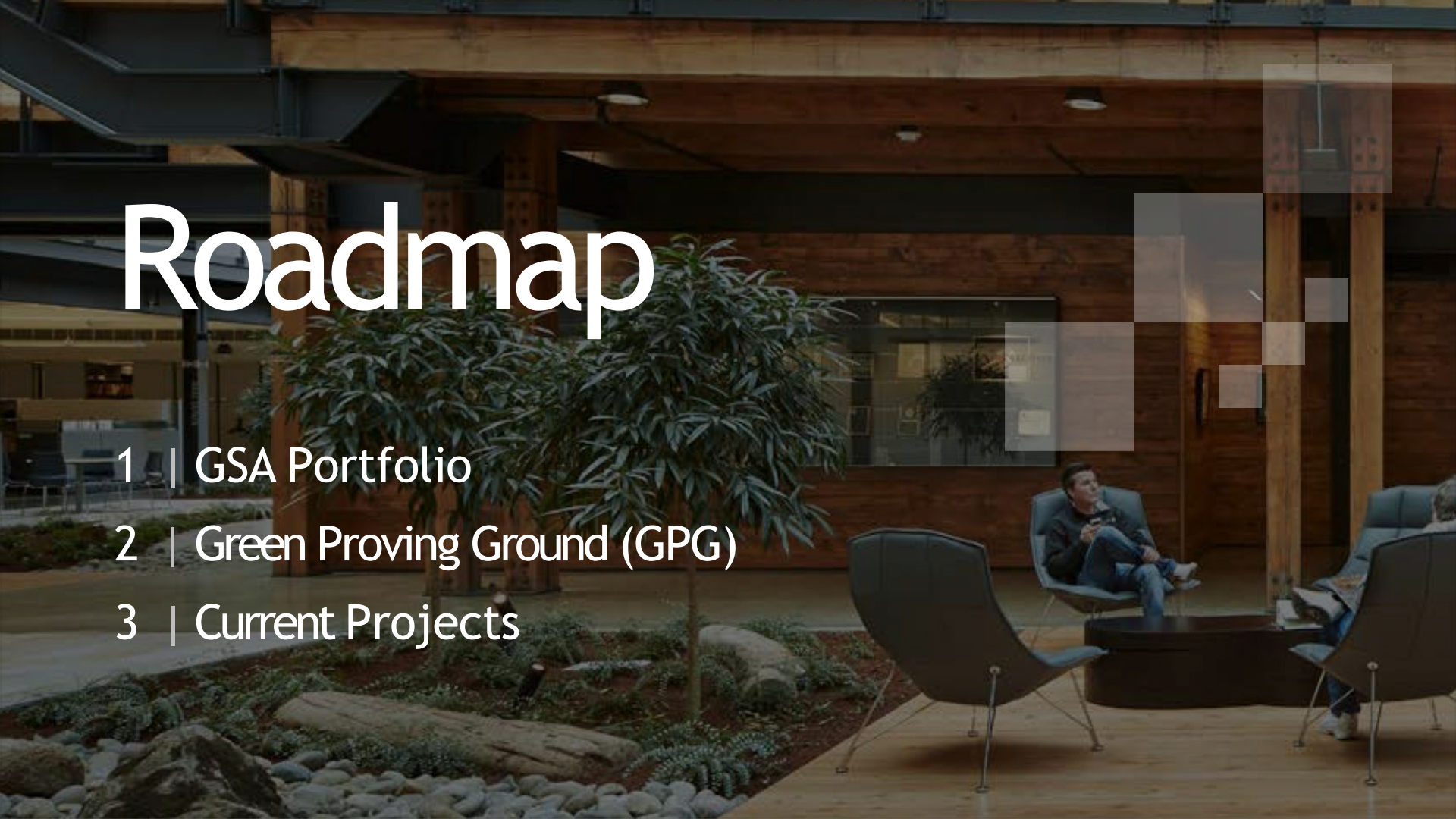
GSA Center for Emerging Building Technologies

Green Proving Ground

Joshua Banis | May 2024



Roadmap

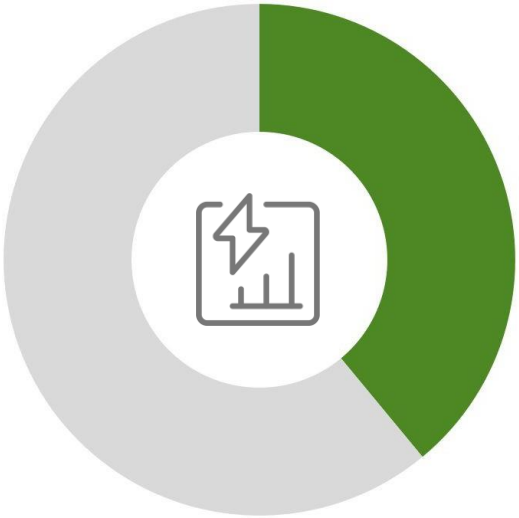
1 | GSA Portfolio

2 | Green Proving Ground (GPG)

3 | Current Projects

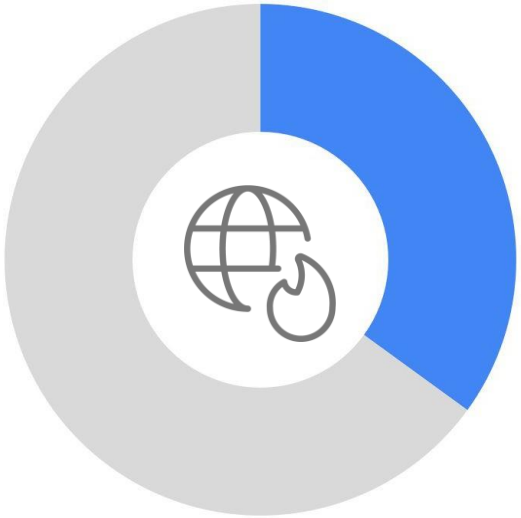
GSA Portfolio

Building Energy Use



39%

of U.S. energy use



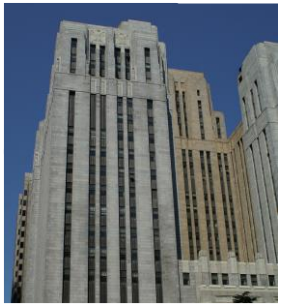
35%

of U.S. carbon emissions




What Does GSA Manage?



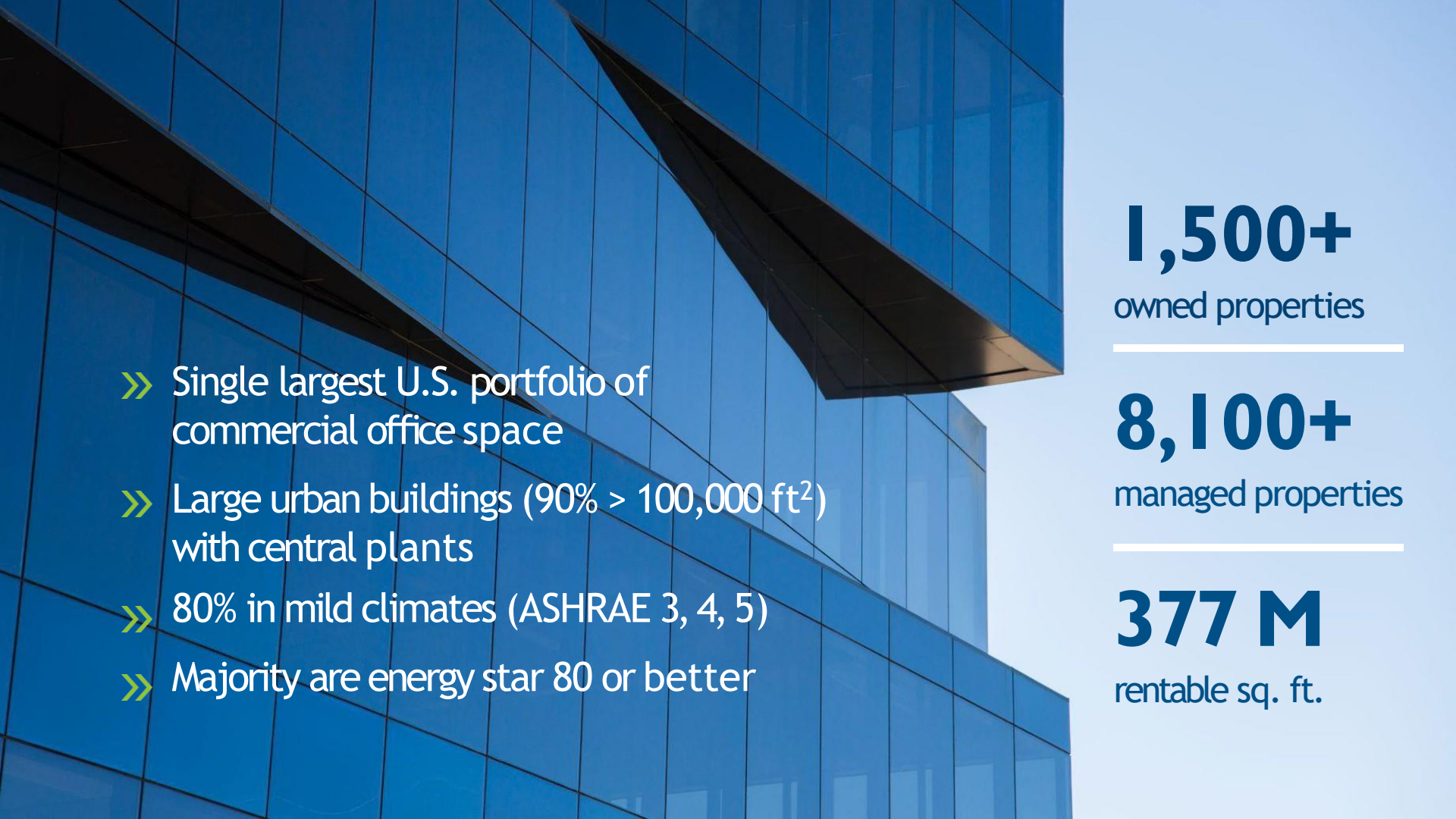










- Single largest U.S. portfolio of commercial office space
- Large urban buildings (90% > 100,000 ft^2) with central plants
- 80% in mild climates (ASHRAE 3, 4, 5)
- Majority are energy star 80 or better

1,500+
owned properties

8,100+
managed properties

377 M
rentable sq. ft.

BIG Audacious REQUIREMENTS

Executive Order 14057: Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability

» **2030**

100% carbon pollution-free electricity (CFE)

65% reduction of operational GHG (2008 baseline)

Net-zero-ready new construction and modernization

» **2035**

100% zero emission vehicles in federal fleet (450,000 vehicles)

» **2045**

Net Zero Carbon Operations across building portfolio

Federal Building Performance Standard

» **2030**

30% of portfolio eliminates scope 1 emissions

Funds to Maximize GSA Building Performance & Minimize GHG Emissions

Assistance for Federal Buildings §60502 (HPGB)

$250M

available until Sept. 30, 2031

to convert GSA facilities to high-performance green buildings (as defined in Section 401 of EISA)

Use of Low-Carbon Materials §60503 (LEC)

$2.15B

available until Sept. 30, 2026

to acquire and install materials and products for construction or alteration of GSA buildings that have substantially lower levels of embodied greenhouse gas emissions, as determined by EPA

GSA Emerging Tech §60504 (E&ST)

$975M

available until Sept. 30, 2026

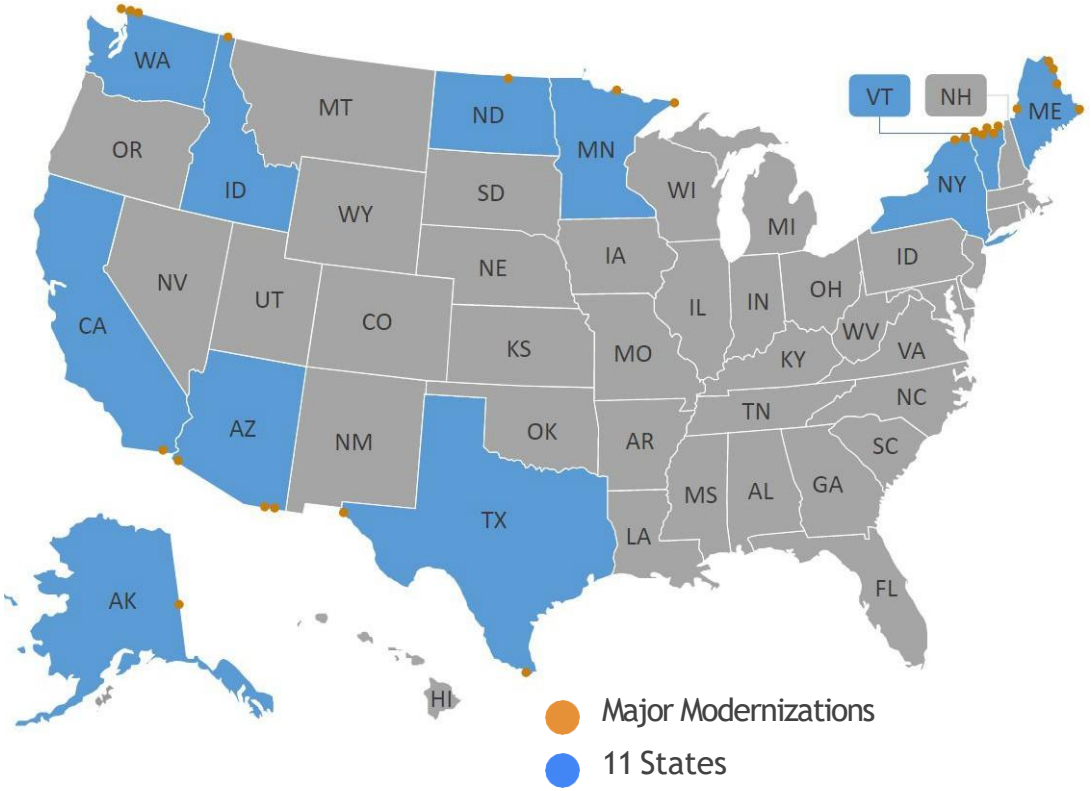
for emerging and sustainable technologies, and related sustainability and environmental programs

Bi-Partisan Infrastructure Law, 2021

$3.75B

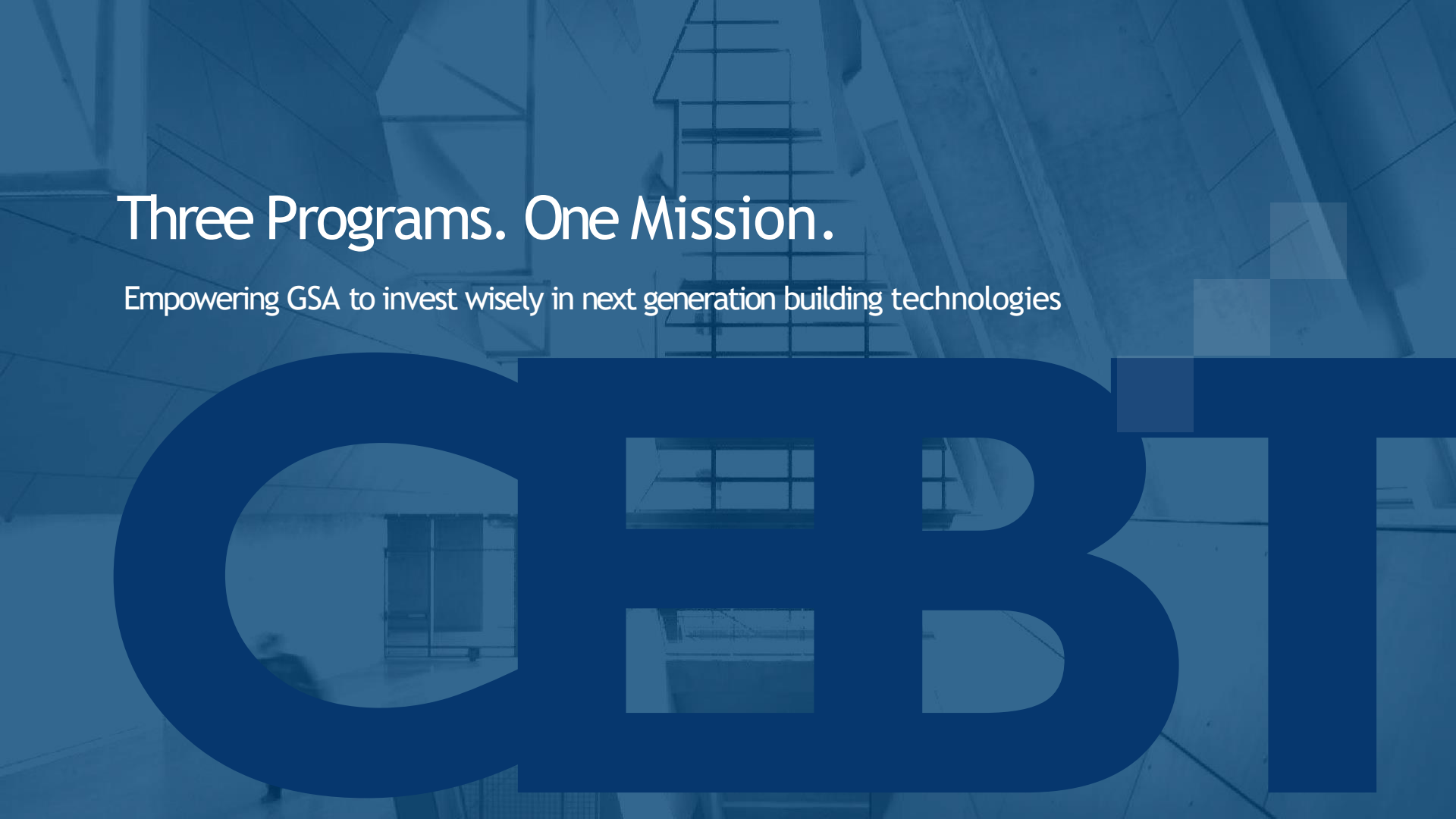
To modernize and improve

>60 LPOEs



Three Programs. One Mission.

Empowering GSA to invest wisely in next generation building technologies



CEBT Programs

CEBT Strategic Goals

GSA Green Proving Ground (GPG)

Select promising emerging technologies at the edge of commercialization

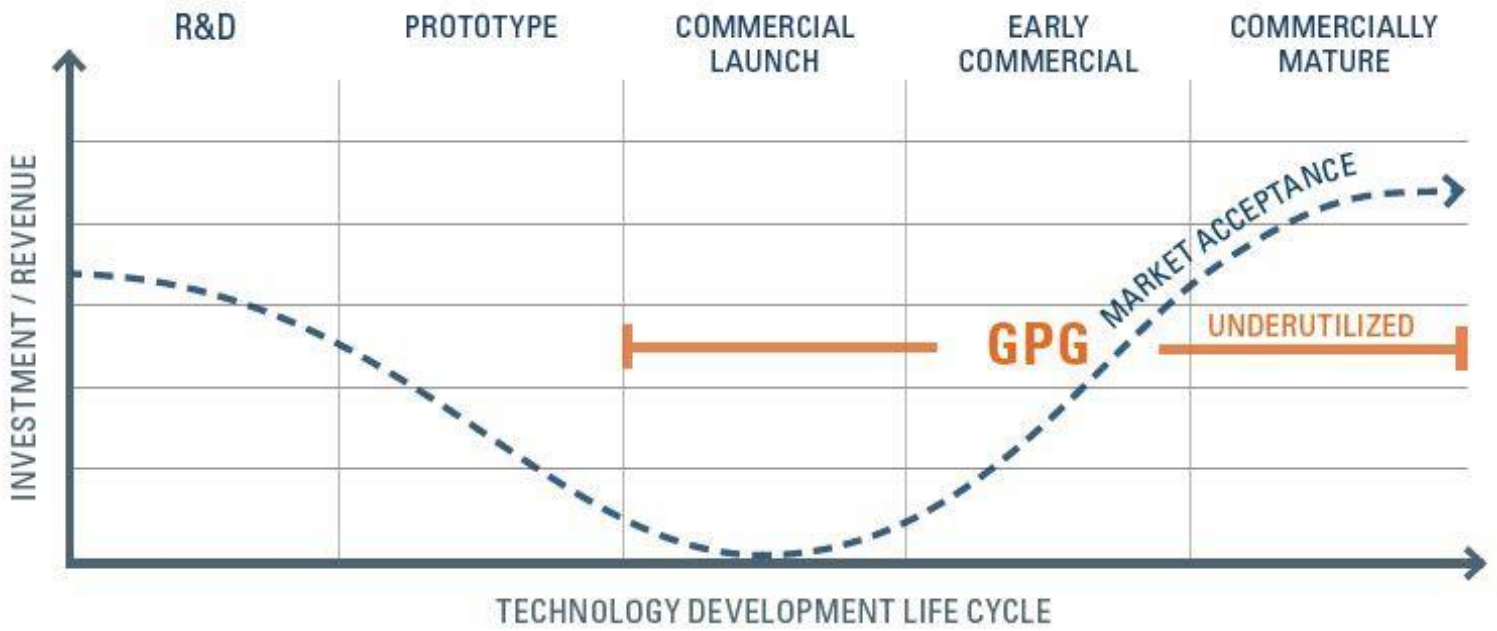
Pilot emerging technology installations within GSA's real-estate portfolio

Partner with DOE national laboratories to evaluate real-world performance

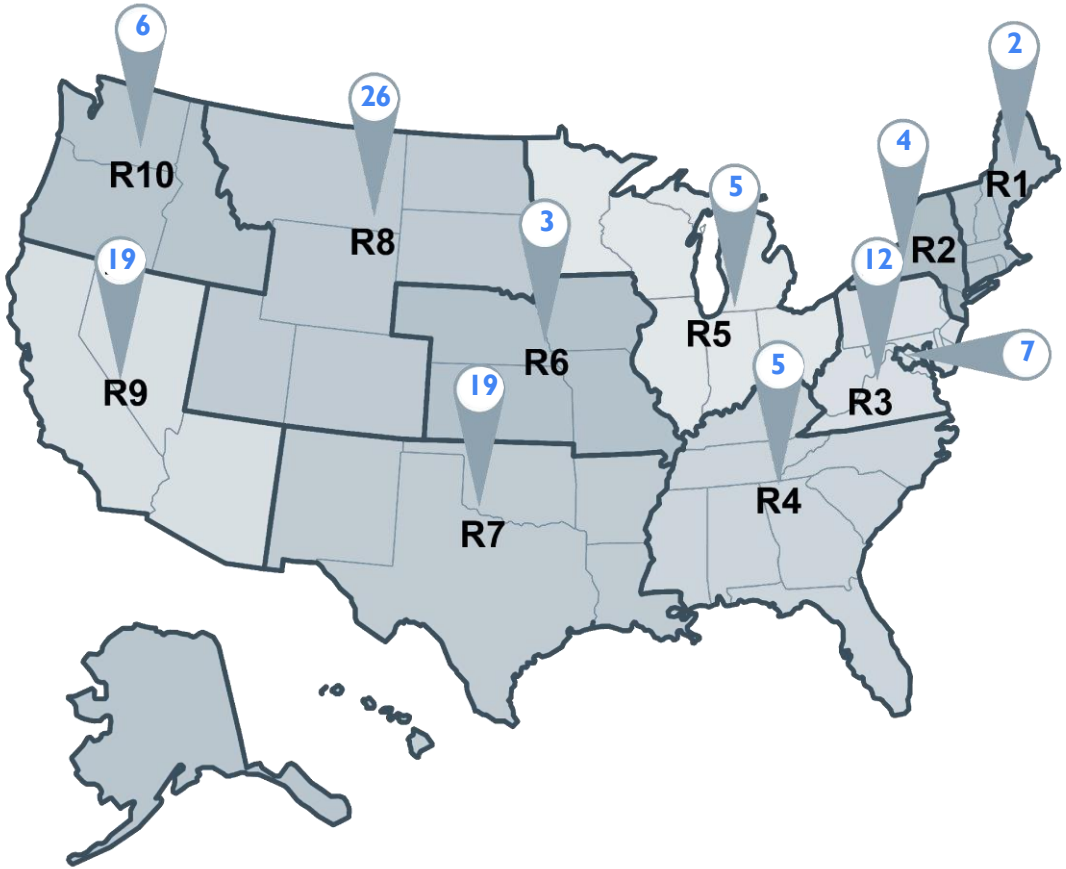
Identify proven technologies with broad deployment potential for GSA

Field Validations Help Bridge the Gap

4 out of 5 innovative building technologies are never fully commercialized.
Why? Skepticism from facility managers, who live by the “tried and true.”

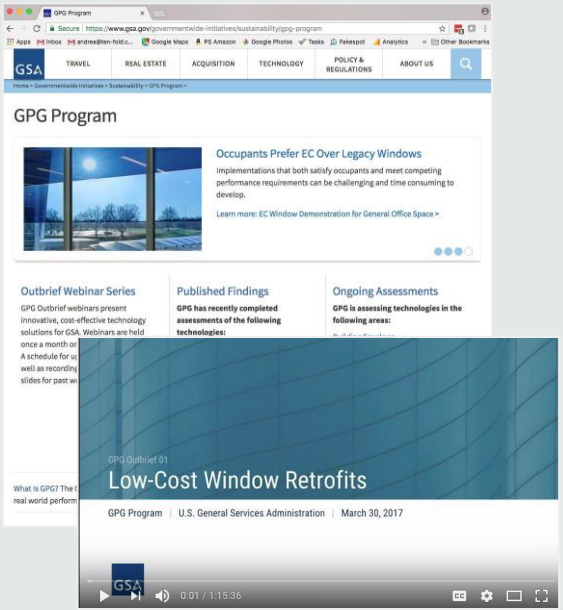


GPG Test Beds 2011-2022



Test-bed locations are representative of diverse conditions

Publicly Available Test-bed Results

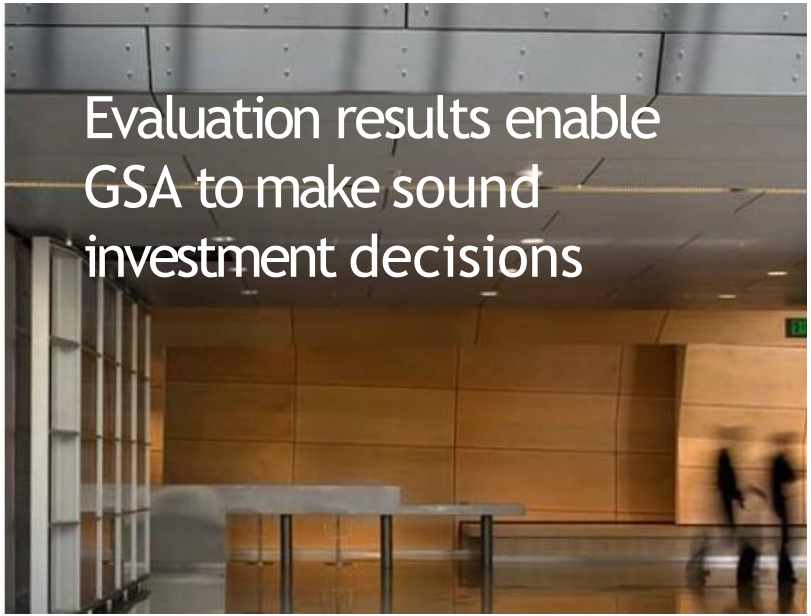


Overview Infographics

Technical Report & 4-Page Findings

Website & Webinars

Provide Actionable Data



965
technology applications

104
technologies evaluated

53
published reports

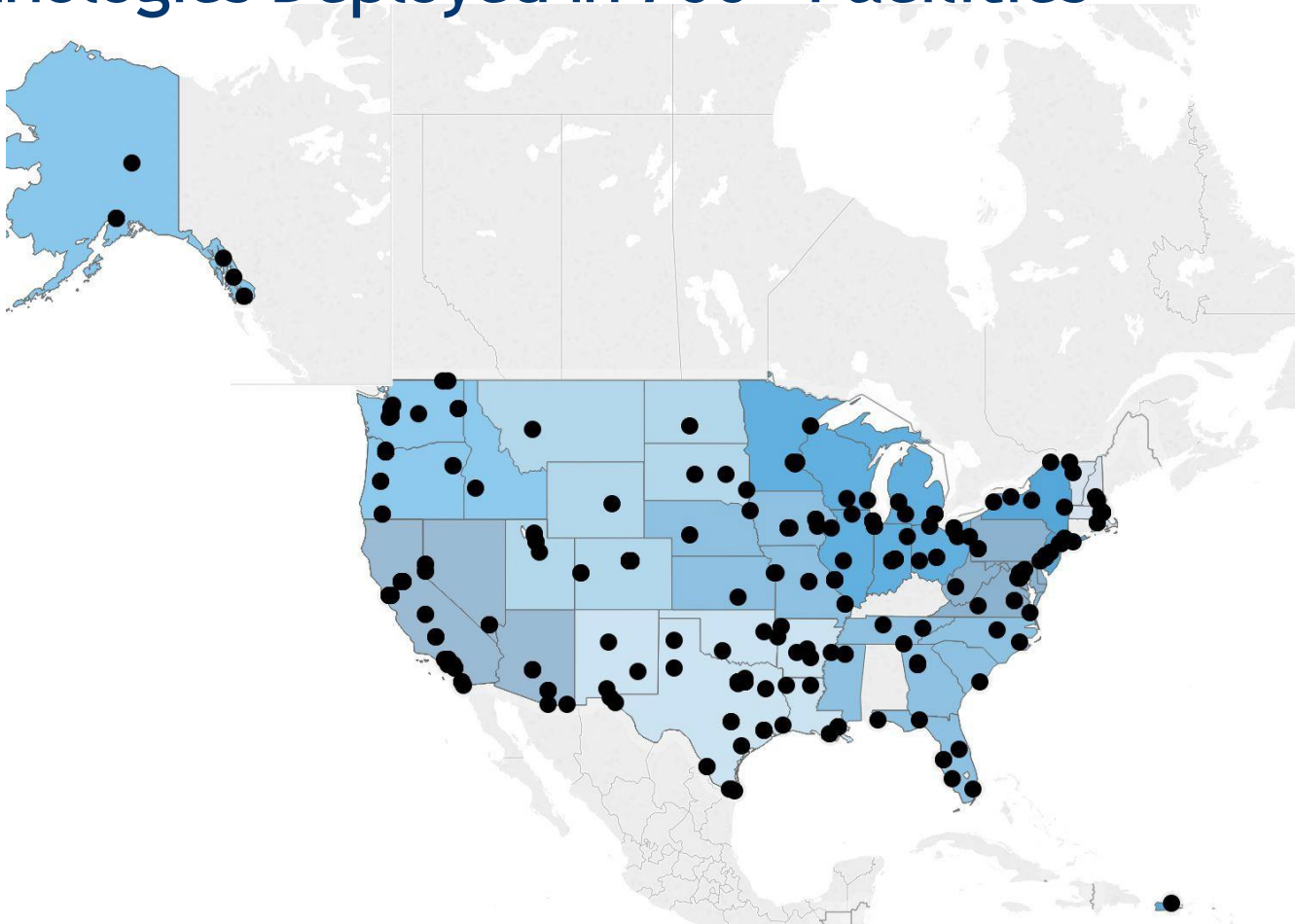
30
proven technologies

23 GPG Technologies Deployed in 700+ Facilities

960K MMBTU
total annual energy savings

$375M
total lifecycle cost avoidance

116K tons
annual CO_2 Reduction




What We're
Working On

Grid Interactive Buildings (GEB) Cohort

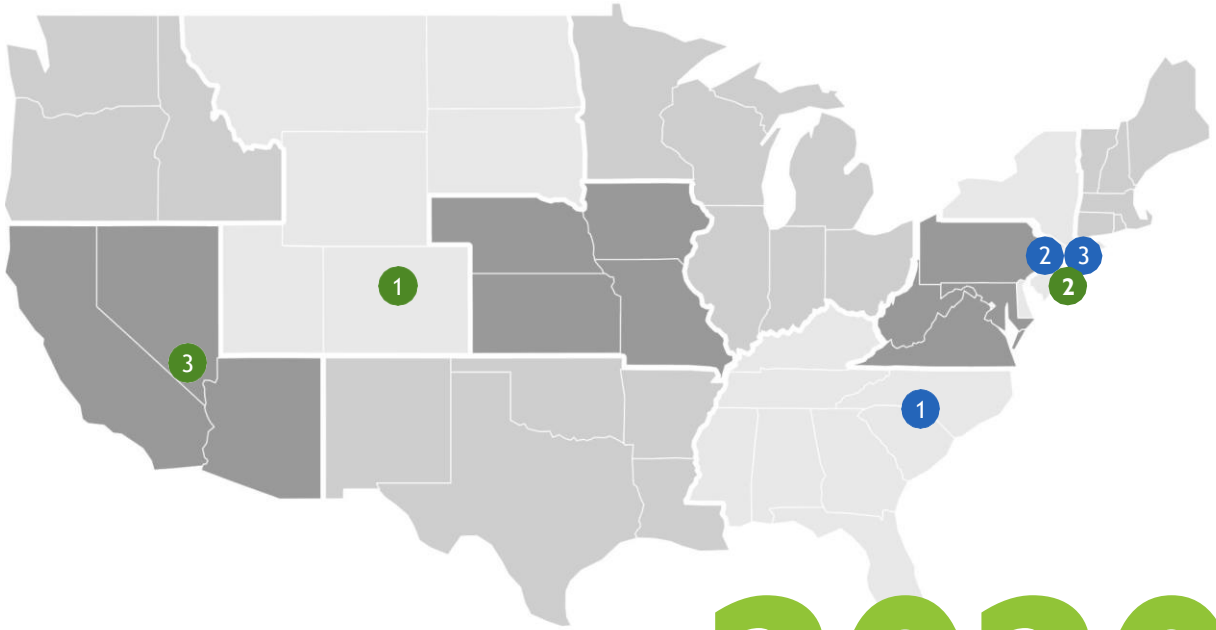
Continuous demand management and load flexibility

Vendor Locations

1 Direct Energy Partners | DC Microgrid
2 Logical Buildings/Comcast | Gamified GEB
3 Prescriptive Data | Occupancy-Based GEB

Testbed Locations

1 Direct Energy Partners | Denver Federal Center
2 Logical Buildings/Comcast | Newark, NJ
3 Prescriptive Data | Las Vegas, NV



2020

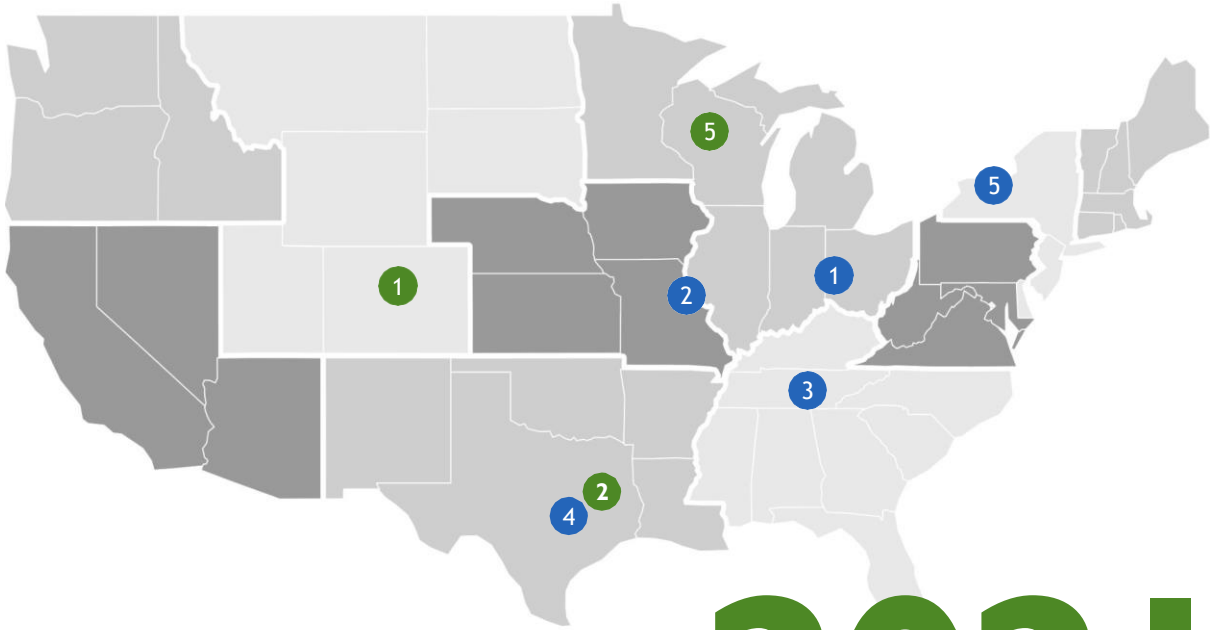
Healthy & Resilient Buildings Cohort

Vendor Locations

1 Aeroseal | Automated Air Sealing
2 Altaire | HVAC Pretreatment Dehumidification
3 eSpin | Nanofiber Air Filters
4 Infinitum | Coreless Axial Flux Motor
5 WexEnergy | Window Insulation Panels

Testbed Locations

1 Aeroseal | Denver Federal Center
2 Altaire | Burke USCH, Texas
3 eSpin | Inconclusive
4 Infinitum | Inconclusive
5 WexEnergy | Eau Claire FB, Wisconsin



202 I

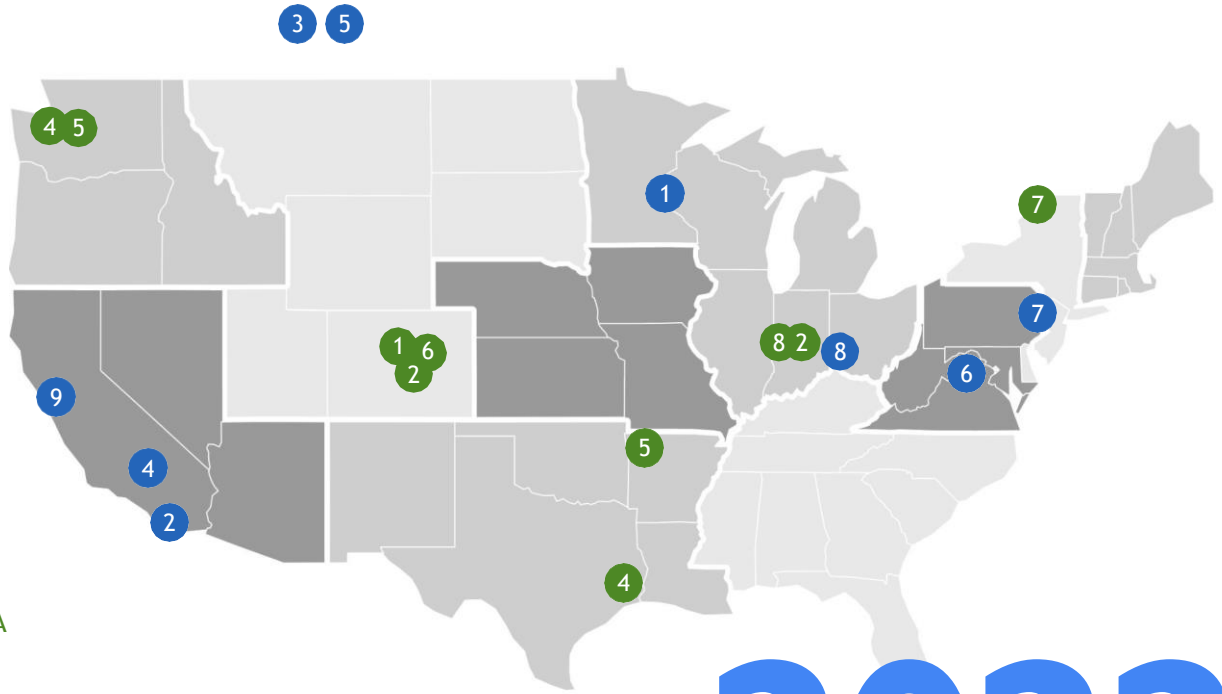
2022 Cohort: Net Zero Carbon Buildings

Vendor Locations

1 3M | Non-Metalized Window Film
2 BEAM Global | Portable EV Charging
3 Clean02 | Carbon Capture
4 Dalrada | C02-Based Commercial Heat Pump
5 Endo Enterprises | Hydronic Additive
6 Fermata Energy | Bi-Directional EV Charging
7 Legend Power | Electrical Power Improvement
8 Rocking Solar | Solar PV Tracking
9 WeaveGrid | Managed EV Charging

Testbed Locations

1 3M | Lakewood, CO
2 BEAM Global | Indianapolis, IN + Lakewood, CO
3 Clean02 | On Hold
4 Dalrada | Beaumont, TX + Seattle, WA
5 Endo Enterprises | Fayetteville, AR + Seattle, WA
6 Fermata Energy | Lakewood, CO
7 Legend Power | Alexandria Bay, NY
8 Rocking Solar | Indianapolis, IN
9 WeaveGrid | Cancelled

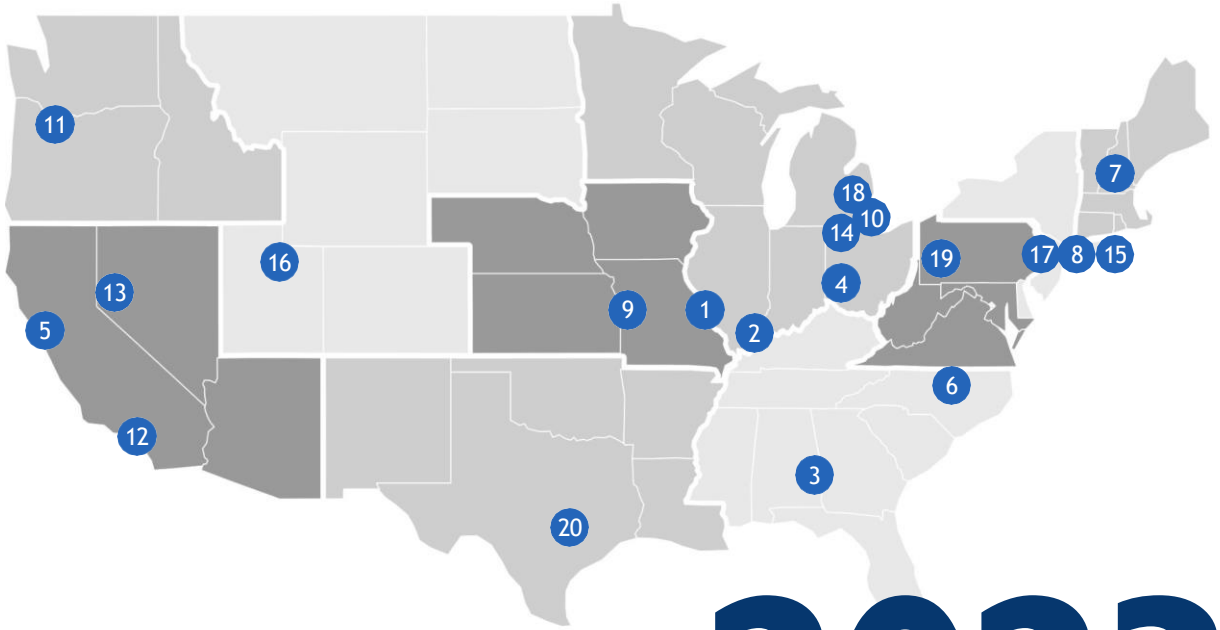


2022

2023 Cohort: Net-Zero Carbon Buildings II

Vendor Location

1 Accelerate Wind | Parapet--mounted turbines
2 Academy Energy/PURO | Upper & whole room GUV
3 ADS-TEC | Battery buffered DC fast charger
4 Aeroseal | Duct sealing
5 BP Pulse Fleet | Optimized fleet charging
6 Biomason | Bio-crete
7 Cambio AI | Portfolio decarbonization prioritization
8 COI Energy | GEB/DR management
9 Far UV | Whole room GUV
10 GM | Vehicle-to-Grid (V2G) solution
11 INDOW | Secondary glazing
12 Loop | Turnkey EVSE fleet charging
13 nZero | Carbon management platform
14 Pilkington | Vacuum-insulated glazing (VIG)
15 Radiator Labs | Thermostatic radiator cover
16 R-Zero Systems | Upper room GUV
17 Signify | Modular lighting + controls
18 Toggled | Plug load control
19 Vitro Glass | R14 secondary glazing
20 Yotta Energy Modular PV and storage

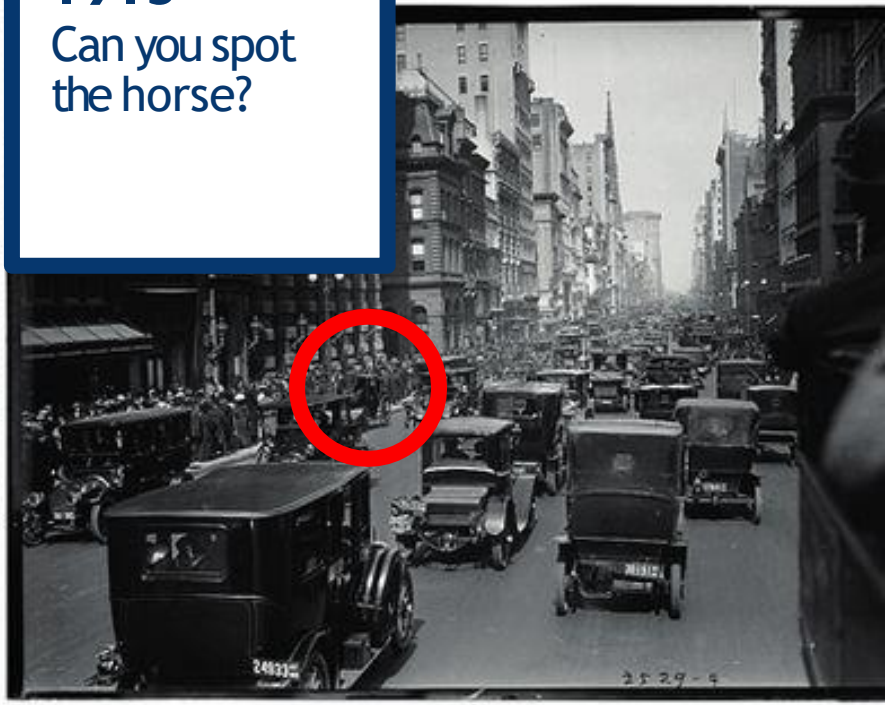


2023

What Technology Disruption Looks Like

1900
Can you spot the car?

1913
Can you spot the horse?



NYC Easter Parade, 5th Avenue

GSA Center for Emerging Building Technologies

For more information: gsa.gov/GPG

Joshua Banis, GPG Program Manager
joshua.banis@gsa.gov