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Report to Congressional Requesters

September 2023

FEDERAL BUILDINGS

Capital Access and Market Options Are Key Challenges Facing GSA's Sustainability Efforts

Accessible Version

GAO-23-105905

GAO Highlights

Highlights of GAO-23-105905, a report to congressional requesters

September 2023

FEDERAL BUILDINGS

Capital Access and Market Options Are Key Challenges Facing GSA's Sustainability Efforts

Why GAO Did This Study

GSA owns and leases more than 371 million square feet of space in 8,600 buildings used to support federal agencies' missions. These buildings consume a significant amount of energy and are responsible for much of the federal government's greenhouse gas (such as carbon dioxide) emissions.

Since the early 2000s, laws and executive orders have established goals for GSA and other federal agencies to operate their buildings sustainably, such as by using energy and water efficiently and reducing greenhouse gas emissions. In 2021, an executive order set new long-term sustainability goals including that agencies' buildings obtain electricity from "carbon-free" sources and have "net-zero" greenhouse gas emissions. Federal law also emphasizes the use of performance contracts to deliver projects needed to advance the sustainability of federal buildings.

GAO was asked to review GSA's efforts to implement sustainability measures across its buildings portfolio. This report describes: (1) GSA's key efforts to incorporate sustainable practices; (2) GSA's recent progress toward government-wide building sustainability goals; and (3) challenges that GSA faces in meeting future government-wide sustainability goals.

GAO reviewed laws, executive orders, GSA policies, facilities standards, and sustainability plans; analyzed reports detailing GSA data for fiscal years 2018 to 2021 relative to sustainability goals; and interviewed officials from GSA's central office and each of the agency's 11 regional offices.

View GAO-23-105905. For more information, contact Catina Latham at (202) 512-2834 or lathamc@gao.gov.

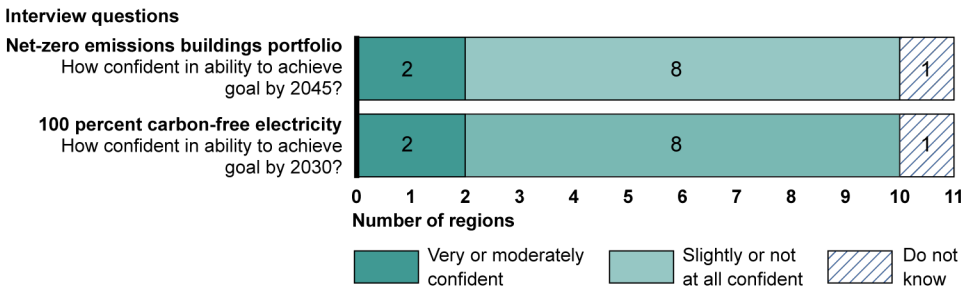
What GAO Found

Since 2006, the General Services Administration (GSA) has incorporated leading sustainability principles into its processes and practices for designing, constructing, and maintaining its buildings portfolio. In addition, GSA tests innovative building technologies and materials that enhance sustainability such as insulation that reduces heating and cooling needs. In 2011, GSA established a program to bundle multiple projects in existing buildings with the goal of reducing the buildings' energy use by at least 40 percent and making them more sustainable. Recently, in response to the December 2021 issuance of Executive Order 14057, GSA updated its standards to promote replacing existing fossil fuel systems to maximize energy efficiency and emissions reduction.

GSA has reported progress toward key sustainability goals in recent years across its buildings portfolio. From fiscal years 2018 to 2021, the share of eligible owned buildings that GSA had designated as sustainable increased from 24 to 31 percent. Over these same years, GSA reported progress in sustainability metrics to the Office of Management and Budget. GSA's aggregated buildings portfolio data show it exceeded prior goals for energy efficiency, water efficiency, emissions reduction, and renewable electricity share in fiscal year 2021.

GSA officials cited lack of access to capital as a challenge it faces in meeting future federal sustainability goals. GSA officials said the scale and scope of the projects needed to achieve net-zero building emissions by 2045 will require resources beyond what has historically been available. Officials from nearly all of GSA's 11 regions expressed little confidence in their ability to meet this goal (see figure). To address this challenge, GSA officials said the agency may need to more regularly provide upfront funding to make energy savings performance contracts economically viable. Further, these officials said they are encouraging regions to consider using Inflation Reduction Act funding, when possible.

Responses of GSA Regional Officials to GAO Questions about Federal Sustainability Goals



Source: GAO analysis of General Services Administration regional officials' responses to structured interview questions. | GAO-23-105905

Data for Responses of GSA Regional Officials to GAO Questions about Federal Sustainability Goals

Interview questions	Very or moderately confident	Slightly or not at all confident	Do not know
Net-zero emissions buildings portfolio How confident in ability to achieve goal by 2045?	2	8	1
100 percent carbon-free electricity How confident in ability to achieve goal by 2030?	2	8	1

Source: GAO analysis of General Services Administration regional officials' responses to structured interview questions. | GAO-23-105905

GSA officials also cited limited market options as a challenge in meeting future federal sustainability goals. Officials from more than half of GSA's regions told GAO that their access to carbon-free electricity is currently limited—and nearly all expressed little confidence in their ability to achieve the goal of 100 percent carbon-free electricity use by 2030 (see figure). To address this challenge, GSA has created an office to conduct market research and identify opportunities for interagency coordination on carbon-free electricity purchases.

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Abbreviations

Btu	British thermal unit
CEQ	Council on Environmental Quality
COVID-19	coronavirus disease 2019
EIA	U.S. Energy Information Administration
EPA	Environmental Protection Agency
GSA	General Services Administration
LED	light-emitting diode

LEED	Leadership in Energy and Environmental Design
MOU	Memorandum of Understanding
OMB	Office of Management and Budget

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
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September 7, 2023

The Honorable Gary C. Peters
Chairman
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Sam Graves
Chairman
The Honorable Rick Larsen
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The General Services Administration (GSA) owns and leases more than 371 million square feet of space in 8,600 buildings across more than 2,200 communities nationwide. To fulfill their missions, federal agencies rely upon GSA buildings for uses including office space, land ports of entry, courthouses, laboratories, and post offices. Congress recently appropriated over $10 billion from GSA's Federal Buildings Fund to be used for construction, acquisition, security, rent, and operations of GSA's building portfolio.[1] This portfolio includes more than 1,500 owned buildings that, as we previously reported, average more than 50 years old.[2] These aging buildings are responsible for much of the federal

[1]Consolidated Appropriations Act, 2023, Pub. Law No. 117-328, div. E, tit. V, 136 Stat. 4459, 4682-84. The Public Buildings Act Amendments of 1972 established the Federal Buildings Fund into which GSA deposits rent collected from tenant agencies. Pub. L. No. 92-312, § 3, 86 Stat. 216, 218 (June 14, 1972), codified as amended at 40 U.S.C. § 592. Congress annually provides obligational authority to GSA for use of the Federal Building Fund's resources for the construction, operation, and maintenance of assets in its buildings portfolio.

[2]In 2015, we found that GSA's "consistently poor-performing buildings" in terms of generating income were, on average, 23 years older than other buildings. At that time, our review of 12 years of GSA data on 1,283 buildings found that 251 of these designated as consistently poor-performing buildings had an average age of 70 years. The other 1,032 buildings had an average age of 47 years. Overall, the average age of the buildings in GSA's portfolio based upon these data was more than 50 years. GAO, *Federal Real Property: GSA Needs to Determine Its Progress toward Long-term Sustainability of Its Portfolio,* GAO-15-609 (Washington, D.C.: July 15, 2015).

government's greenhouse gas emissions, energy and water use, and waste generation.[3]

GSA has had sustainability initiatives underway related to its buildings portfolio for over a decade. Since the early 2000s, laws and executive orders have established goals for GSA and other federal agencies to increase efficiency and improve sustainability through reductions in buildings' greenhouse gas emissions, energy use, water use, and waste. These goals consist of, among other things, improving energy and water efficiency compared to prior years' baselines and reducing greenhouse gas emissions associated with the design, construction, operation, and maintenance of the federal buildings portfolio. GSA has taken steps to achieve these goals, but the needs posed by other priorities—such as addressing the agency's deferred maintenance and repair backlog—may limit progress toward their full achievement.[4]

You asked that we review GSA's efforts to implement sustainability measures across its buildings portfolio. This report describes

- GSA's key efforts to incorporate sustainable building practices into the management of its buildings portfolio;
- GSA's recent progress toward government-wide building sustainability goals; and
- the challenges GSA officials cited in meeting future government-wide sustainability goals.

To describe GSA's key sustainability efforts to operate and maintain its buildings portfolio, as well as the challenges associated with meeting recently established government-wide building sustainability goals, we reviewed relevant laws, GSA and government-wide policies and GSA facilities standards, sustainability plans, and reports. We also conducted structured interviews with relevant officials at GSA's central office and all

[3]According to the Environmental Protection Agency (EPA), greenhouse gases are those that trap heat in the atmosphere. These gases are the most significant driver of observed climate change since the mid-20th century, according to EPA. Of the greenhouse gases, carbon dioxide is the primary gas emitted through human activities.

[4]In 2022, GSA reported that insufficient funding for its maintenance and repair requirements over the past decade had resulted in $3.1 billion in deferred maintenance and repair needs (as of the end of fiscal year 2022). General Services Administration, *2022 Agency Financial Report: Adapting to Our Changing World*, (Washington, D.C.: 2022).

of GSA's 11 regional offices. While there is no uniform definition of the term "sustainability," for the purpose of this report, we refer to federal sustainability as the suite of legal requirements and executive orders related to minimizing the environmental impacts of building construction, modernization, and operations. Further, while there are other areas for which the federal government and GSA have established sustainability-focused goals and taken steps to achieve them, we focused on those goals and efforts pertaining to designing, constructing, renovating, and operating GSA-owned and -leased buildings.[5]

To describe GSA's progress toward government-wide building sustainability goals, we reviewed reports published by the Office of Management and Budget (OMB) that include GSA facility data originating from the Federal Real Property Profile and other agency-submitted data for fiscal years 2018 to 2021.[6] Specifically, we reviewed GSA data on the agency's number of buildings designated as sustainable and on its buildings' energy use, water use, greenhouse gas emissions, solid waste generation, and share of electricity originating from renewable sources. We selected these years because fiscal year 2018 was the first year GSA submitted these data to OMB, and fiscal year 2021 was the most recent year for which data were available for reporting. To assess the reliability of the data we used, we reviewed GSA documentation on the systems where the data were kept and interviewed GSA officials about the controls in place to ensure the accuracy of the data we received. We found these data to be reliable for the purposes of our reporting objectives.

We conducted this performance audit from March 2022 to September 2023 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

[5]GSA's sustainability efforts also include other areas beyond the scope of this report, such as but not limited to the electrification of vehicle fleets.

[6]From fiscal years 2018 to 2020, OMB titled this annual report the 'Scorecard for Efficient Federal Operations/Management.' In fiscal year 2021, it changed the title to the 'Scorecard for Federal Sustainability.' These reports are publicly available online at www.sustainability.gov.

Background

Laws, Executive Orders, and Agency Guidance Related to Building Sustainability

Over the last two decades, laws, executive orders, and agency guidance have established government-wide sustainability policies, goals, and best practices related to building sustainability. From the early to mid-2000s, laws, an executive order, and federal agencies established the following:

- *Energy Policy Act of 2005* required federal buildings to be metered to improve energy efficiency.[7]
- *Energy Independence and Security Act of 2007* established the GSA Office of Federal High-Performance Green Buildings, which is charged with developing government-wide best practices, guidance, and tools pertaining to budgeting and contracting to minimize the environmental impact of federal buildings. One specific goal this law established is that new federal buildings and federal buildings undergoing major renovations must reduce fossil fuel–generated energy consumption by increasing percentages, reaching 100 percent reduction in 2030.[8]
- Executive Order 13423 (2007, now rescinded) *Strengthening Federal Environmental, Energy, and Transportation Management* required agencies to improve energy efficiency by 3 percent annually through fiscal year 2015, ensure that at least half of their renewable energy comes from new renewable sources, and reduce water use by 2 percent annually.[9]

[7]Pub. L. No. 109-58, § 103, 119 Stat. 594, 608 (2005).

[8]Pub. L. No. 110-140, §§ 433, 121 Stat. 1492, 1612 (2007). As of August 2023, the Department of Energy has not finalized regulations implementing these requirements. See Supplemental Notice of Proposed Rulemaking, 87 Fed. Reg. 78382 (Dec. 21 2022). The most recent round of comments related to the rulemaking were due on March 23, 2023. 87 Fed. Reg. 12267 (Feb. 2, 2023).

[9]The percentage of energy use reductions is relative to the baseline of agency energy use in fiscal year 2003. Annual water reduction goals relative to the baseline water consumption in fiscal year 2007 that were established in this executive order began in fiscal year 2008 and extended through the end of fiscal year 2015. See Exec. Order No. 13423, 72 Fed. Reg. 3919 (Jan. 26, 2007).

- Originally developed in 2006 by the Council on Environmental Quality (CEQ), GSA, and select federal agencies, the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* Memorandum of Understanding reflected leading practices in designing, constructing, and operating federal buildings.[10] These leading practices were aimed at helping federal agencies reduce facilities costs, improve energy and water efficiency, and promote sustainable environmental stewardship.

More recently, Congress, the President, and agencies have continued to enact legislation and issue executive orders and policies to advance the sustainability of federal buildings.

- *Energy Act of 2020* requires agencies to identify and implement all energy and water savings measures that are lifecycle cost-effective, and use performance contracts to implement at least 50 percent of these measures.[11] We discuss performance contracts in greater detail below.
- Most recently updated in 2020 as the *Guiding Principles for Sustainable Federal Buildings and Associated Instructions,* CEQ further refined the practices that call for agencies to design, construct, and operate their buildings in consideration of these key sustainability factors:
  - employ integrated design principles;
  - optimize energy performance;
  - protect and conserve water;
  - enhance indoor environmental quality;
  - reduce the environmental impact of materials; and
  - assess and consider building resilience.[12]

[10]Within the Executive Office of the President, CEQ coordinates the federal government's efforts to improve, preserve, and protect America's public health and environment. Created in 1969 by the National Environmental Policy Act, CEQ advises the President and develops policies on climate change, environmental justice, federal sustainability, public lands, oceans, and wildlife conservation, among other areas.

[11]*Energy Act of 2020*, § 1002, Pub. Law No. 116-260, div. Z, 134 Stat. 2418, 2426 (2020).

[12]In this context, "building resilience" refers to the ability of a building to withstand climate-related hazards. While building resilience is a guiding principle, it is outside the scope of this report.

- Executive Order 14057 (2021) *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability* is the most recent iteration of federal sustainability policy. This order shifts the focus from energy and water use reductions compared to a base year to working toward the long-term goal of net-zero emissions economy-wide by 2050.[13] To achieve this long-term goal, the order also established nearer-term goals for federal buildings focused on net-zero emissions, use of carbon pollution—free electricity (which we refer to as "carbon-free electricity" throughout this report), and net-zero emissions federal procurement. In particular, the order requires:
  - By 2030, obtain 100 percent of electricity used to power federal buildings from sources that generate no carbon emissions. Such sources of carbon-free electricity include solar power, wind power, hydroelectric power, and nuclear power. This power can be generated on-site, purchased from an energy provider, or a combination of the two.
  - By 2030, reduce greenhouse gas emissions by 65 percent for emissions directly attributable to federally owned or controlled facilities (referred to as Scope 1 emissions) and for emissions associated with the purchases of energy (referred to as Scope 2 emissions), as compared to 2008 levels.[14]
  - By 2045, achieve net-zero building emissions—with a 50 percent reduction by 2032, compared to 2008 levels. In the context of this policy, a "net-zero emissions portfolio" is one where, at the agency level, the targeted Scope 1 and Scope 2 greenhouse gas emissions from all federal facilities are reduced by the maximum extent feasible. The remaining emissions are then balanced so that the annual emissions equal zero. To achieve this, the

[13]Exec. Order No. 14057, 86 Fed. Reg. 70935 (Dec. 8, 2021).

[14]Greenhouse gas emissions are categorized as Scope 1, 2, or 3 emissions in CEQ's *Federal Greenhouse Gas Accounting and Reporting Guidance*. This categorization is based on the *GHG Protocol Corporate Accounting and Reporting Standard*, produced by the Greenhouse Gas Protocol Initiative—a multi-stakeholder group of businesses, governments, nongovernmental organizations, and others—that developed a standardized methodology for quantifying and reporting greenhouse gas emissions. Scope 1 emissions are from sources that are controlled or owned by an organization such as on-site boilers, furnaces, and generators. Scope 2 emissions are indirect emissions associated with an organization's purchase of electricity, steam, heat, and cooling. Scope 3 emissions are also indirect and are based on the emissions produced by all other upstream and downstream activities of a building's operation. In the context of this report, an example of Scope 3 emissions might include the greenhouse gases associated with the purchase of materials used in construction or to make repairs. The Scope 3 emissions for one organization are the Scope 1 and 2 emissions of another organization.

implementation instructions for the order state that GSA and other federal agencies will need to, among other things, replace fossil fuel-based building systems (such as space-heating and water-heating systems) with electric building systems and reduce energy consumption.

- By 2050, achieve net-zero emissions from federal procurement (referred to as Scope 3 emissions). To do this, the order states that agencies should pursue procurements that aim to reduce emissions embodied in the purchase of products and services.

- *The Federal Building Performance Standard* (2022) is a policy developed by CEQ, as required by Executive Order 14057, which aims to help agencies meet the goals of the order by eliminating on-site fossil fuel use in their buildings and facilities. For example, this policy calls for agencies to work toward zero Scope 1 emissions from on-site fossil fuel use through the electrification of 30 percent of their buildings by fiscal year 2030, measured by square footage. This standard further promotes "deep energy retrofits" and strategic equipment replacement in existing buildings, campuses, and installations to meet emission and energy reduction goals set by Executive Order 14057. Deep energy retrofits are a holistic approach to replacing building systems and equipment in existing buildings that maximize energy efficiency and greenhouse gas emissions reductions.

For additional information and a timeline of key laws and executive orders related to building sustainability, see appendix I.

GSA's Role in Promoting Building Sustainability

GSA has both strategic and operational roles in implementing sustainability efforts in federal buildings. To promote a strategic approach to sustainability across the government, GSA's Office of Federal High Performance Green Buildings develops best practices, guidance, and tools for government-wide use to reduce costs and minimize environmental impacts from the federal buildings portfolio. This office partners with the rest of GSA and other agencies and organizations to pilot, promote, and implement the most promising high-performance practices related to sustainability. For example:

- GSA coordinates with CEQ to develop policies pertaining to federal building sustainability. GSA works with CEQ, for example, in updating requirements for agencies' reporting systems, and in providing instructions to help these agencies capture the data necessary to

report on goals such as reducing greenhouse gas emissions, as well as energy and water use.

- GSA co-chairs the Interagency Sustainability Working Group with the Federal Energy Management Program.[15] This group serves as a forum for information exchange; promotes agency implementation of goals for sustainable buildings; fosters discussions on widespread adoption of sustainable design and operations in the federal sector; and develops technical guidance and tools to support implementation of agency sustainability policies for federally owned and operated buildings, as well as leased spaces.
- GSA consults with the Green Building Advisory Committee for advice and recommendations on issues such as advancing greenhouse gas reductions in buildings and procuring low embodied carbon materials.[16]

For its own portfolio, GSA's Public Buildings Service is responsible for the sustainability efforts associated with the design, construction, operation, and maintenance of its owned buildings and leased spaces. According to GSA, Public Buildings Service staff in each of GSA's 11 geographical regions are responsible for the buildings within their regions and administering the associated sustainability efforts. A key activity that regions perform is to incorporate sustainability measures or features into building projects. According to GSA officials, regions work with GSA's central office to develop projects that could be funded from among multiple sources. Examples of funding sources include:

- **Annual appropriations.** As part of the annual budget process, GSA estimates and requests the amount of funding it needs for its Capital Investment Program (which includes sustainability-related projects) in the upcoming fiscal year. In response, Congress appropriates

[15]The Federal Energy Management Program, within of the Department of Energy, works with its stakeholders to enable federal agencies to meet energy-related goals, identify affordable solutions, facilitate public-private partnerships, and provide energy leadership to the country by identifying government best practices.

[16]The Green Building Advisory Committee provides independent policy advice and recommendations to GSA's Office of Federal High-Performance Buildings to advance federal building innovations in planning, design, and operations to reduce costs, enable agency missions, enhance human health and performance, and minimize environmental impacts. The Committee's membership reflects a broad range of stakeholders including senior officials from federal agencies as well as leading high-performance building experts from state, local, private, non-governmental, and academic sectors.

funding—which may differ from what GSA requested—to GSA to implement its projects.

- **Special funding.** Occasionally, GSA will receive funding for sustainability-related activities in enacted legislation other than for annual agency appropriations. For example, the Infrastructure Investment and Jobs Act includes $3.4 billion for GSA to construct, acquire, repair, and alter land ports of entry.[17] GSA plans to use these funds to support 26 projects that will, among other things, incorporate sustainability features such as materials having low-embodied carbon to reduce greenhouse gas emissions. In addition, the Inflation Reduction Act provided GSA with $2.15 billion for the purchase of low-carbon building materials in construction projects; $975 million to support emerging and sustainable technologies; and $250 million for measures to convert more buildings into High Performance Green Buildings.[18]
- **Energy savings performance contracts.** These contracts allow GSA to partner with energy services companies to implement cost-saving energy improvements with little to no upfront capital costs. Energy service companies finance and manage the projects that, for example, replace existing building system components with more energy-efficient components. GSA then pays the contractor over a period of time up to 25 years based on the expected savings from the energy-efficiency improvements. After the contract ends, all additional cost savings accrue to GSA. In instances where the savings over the 25-year payback period are not sufficient to cover the cost of the project, GSA would have to provide upfront funding for the amount of the difference if it chooses to pursue the project.

[17]Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, div J, tit. IV, 135 Stat. 429, 1382-1383 (2021).

[18]*See generally* Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818, 2083 (2022).

GSA Has Incorporated Leading Sustainable Building Principles and Its Efforts Are Evolving to Align with Government-Wide Goals

GSA Has Incorporated Federal Sustainable Building Principles into the Management of Its Buildings Portfolio

Since 2006, GSA has incorporated leading sustainability principles (guiding principles) into its processes and practices for designing, constructing, and maintaining its owned buildings portfolio.[19] GSA's *Facilities Standards for the Public Buildings Service* (*Facilities Standards*) references the guiding principles in setting mandatory standards for all projects, including new construction, repairs and alterations, and privately financed projects such as those delivered via an energy savings performance contract. The *Facilities Standards* require GSA officials to design projects with energy and water efficiency in mind, seek to divert construction waste, and reduce the environmental impact of materials. For example:

- **U.S. Courthouse, Los Angeles, California.** Completed in 2016, the 10-story, 633,000 square foot building incorporates a variety of sustainable design features. These features include green roofs over the jury room and café, a rooftop array of solar panels that convert energy from sunlight into electricity, rainwater collection used for irrigation, and drought-tolerant landscaping. Moreover, the building's pleated fa?ade is designed to maximize the transmission of daylight to interior spaces while also reducing the amount of solar heat that radiates into the building by about half, thus lowering its cooling needs.
- **Margaret Chase Smith Federal Building, Bangor, Maine.** In 2015, GSA completed a 5-year renovation of this 188,000 square foot, 1967 building that included a variety of energy and water efficiency measures along with integration of carbon-free building systems. GSA's renovation project included the replacement of less efficient

[19]In 2006, these guiding principles were called the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings.* In 2008, these principles were updated and called the *Guiding Principles for Sustainable New Construction and Major Renovation* and the *Guiding Principles for Sustainable Existing Buildings.* In 2016, CEQ published the *Guiding Principles for Sustainable Federal Buildings and Associated Instructions.* These guiding principles were last updated in 2020.

systems and components with more efficient ones such as a geothermal heating and cooling system, solar panels, low-energy lighting, high-efficiency windows, and water-conserving plumbing fixtures.

A key requirement set by the *Facilities Standards* is that designs must incorporate at least one technology from GSA's Green Proving Ground program. In 2011, GSA created this program to test and evaluate innovative technologies and practices based on their potential to improve the sustainability of its buildings. Under this program, GSA annually evaluates technologies in real-world settings and approves the most promising ones for deployment within GSA's buildings portfolio. Since the first year of the program, GSA has tested and approved several technologies related to building components and systems. These technologies have led to improvements such as

- building and window insulation that reduces heating and cooling demands;
- heating, cooling, and lighting systems that operate with greater efficiency;
- optimized energy and water use by incorporating sensors and meters in building systems; and
- reduced Scope 2 greenhouse gas emissions (i.e., those attributable to the purchase of electricity) by using renewable energy systems.

Because a building's energy use is a significant factor that affects its ability to operate sustainably, GSA's sustainability efforts focus, in part, on improving its buildings' energy efficiency. For example, in 2011, GSA established its National Deep Energy Retrofit program. A deep energy retrofit involves bundling multiple energy conservation measures into a single project with the goal of reducing on-site energy use by at least 40 percent. Retrofits could include energy conservation measures such as improving insulation, adding daylighting features, automating building systems controls, installing LED lighting, and providing on-site renewable energy generating capacity.[20] For example, in completing a deep energy retrofit at the New Carrolton Federal Building in Maryland, GSA replaced multiple building systems and components such as the building's fluorescent interior lighting system with a more efficient LED system. The

[20]Daylighting is the controlled admission of natural light, direct sunlight, and diffused-skylight into a building to reduce electric lighting and save energy.

new lighting system yielded an 82 percent reduction in energy use compared to the older system; the amount of energy saved was equivalent to the annual energy usage of 250 homes.[21] GSA officials told us that since the program's inception, GSA has completed deep energy retrofits in 172 buildings totaling 64.4 million gross square feet. In 2023, GSA awarded performance contracts for deep energy retrofits in 15 buildings covering 5.5 million gross square feet.[22]

Along with taking steps to improve the sustainability of its owned buildings, GSA has also updated its requirements for leases. These requirements are to ensure that its leased spaces are in buildings that are efficiently operated and contribute to government-wide reduction goals for greenhouse gas emissions. As part of its requirements for leases, GSA includes "green" clauses that require landlords to, among other things, provide third-party certification for energy efficiency through the ENERGY STAR program or meet certain other requirements, and use sustainable cleaning products when the federal lease represents 100 percent occupancy in a building 10,000 rentable square feet or greater.[23] Further, for some leases, GSA requires certain Leadership in Energy and Environmental Design (LEED) certifications for the building in which it is leasing space.

To raise awareness of and provide training on its sustainability initiatives, GSA has developed online tools to help its staff—and those at other federal agencies—learn about and deploy sustainable building technologies. In 2011, GSA developed the *SFTool* for federal facility managers, procurement professionals, leasing specialists, and project managers to enhance their knowledge of federal building sustainability requirements and goals, and provide tools to address these requirements. The tool covers sustainability principles related to project planning and development, procurement, and day-to-day operations and maintenance of facilities. Further, in 2014, GSA developed *Accelerate FM*, a program that allows users to assess their level of knowledge on facilities

[21]Additional components of the retrofit project at the New Carrolton Federal Building include the installation of photovoltaic solar panels, a solar water heating system, higher-efficiency heating and cooling systems, and building automation systems.

[22]Energy savings performance contracts are a key funding mechanism for GSA deep energy retrofits.

[23]The ENERGY STAR requirements were introduced in the Energy Independence and Security Act of 2007 (EISA). Pub. Law. 110-140, § 435, 121 Stat. 1492, 1615 (2007) (codified at 42 U.S.C. § 17091).

management issues such as sustainability. Based on users' self-assessments, the program provides links to training aimed at addressing knowledge gaps and promoting continued professional development.

GSA Is Taking Actions to Achieve New Government-Wide Sustainability Goals

GSA developed its most recent Sustainability Plan (2022) to reflect the new government-wide sustainability goals set by Executive Order 14057, which calls for a net-zero emissions buildings portfolio by 2045. As guided by its plan, GSA is taking action to enable its buildings portfolio to meet this goal by focusing on two significant factors that affect buildings' emissions—electrification of building systems and the generation and procurement of carbon-free electricity. In addition, GSA is taking initial steps to identify how it can reduce the emissions associated with the materials used in its buildings. GSA's actions include the following:

- GSA updated its *Facilities Standards* to include new requirements related to building electrification and sustainable procurement. Among other things, the standards provide guidance for installing all-electric space heating and cooling systems in buildings and purchasing sustainable building materials. For example, GSA created new materials standards for concrete and asphalt to reduce carbon emissions. GSA's concrete standard states that it will only contract with companies whose total emissions are 20 percent lower than national limits recommended by the New Buildings Institute.[24] GSA's asphalt standard requires that its contractors use at least two out of six environmentally-preferable techniques when making and installing the asphalt, such as using reclaimed asphalt or other recycled materials.
- GSA is updating its Green Proving Ground program in response to the goals in Executive Order 14057. According to GSA officials, following the issuance of this executive order, the Green Proving Ground program has focused on technologies that reduce greenhouse gas emissions and enable a transition to net-zero buildings. Additionally, the program has created a building prioritization tool that helps regional teams identify buildings that would be a best fit for transition

[24]New Buildings Institute, *Lifecycle GHG Impacts in Building Codes* (Portland, OR: January 2022). The New Buildings Institute is an independent, nonprofit organization that advocates for net-zero energy and net-zero emission buildings through research, policy, and guidance.

to net-zero operations based on building size, utility consumption data, and the greenhouse gas emissions intensity of the regional electric grid that serves the building.

- In November 2022, the GSA Administrator announced that none of the funding GSA received from the Inflation Reduction Act would be used to install fossil fuel-based building equipment.
- GSA is seeking to leverage its positon as a relatively large energy consumer to make progress toward its goal of transitioning its portfolio to operate fully on energy from carbon-free sources. For example, in November 2022, GSA entered into a Memorandum of Understanding with a private-sector energy provider to develop a non-binding plan that, when fully implemented, would result in all of the provider's federal customers in Arkansas using electricity that is 100 percent attributable to renewable and carbon-free resources.
- In October 2022, GSA published a request for information seeking public input on the availability of locally sourced, low-carbon construction materials to help understand the best way to implement the government-wide Buy Clean Initiative.[25]

GSA Has Reported Key Sustainability Improvements and Is Developing Metrics to Track Progress toward New Government-Wide Emissions Reduction Goals

GSA Has Designated an Increasing Number of Its Buildings as Sustainable since Fiscal Year 2018

GSA formally assesses selected buildings each year to determine whether they meet a series of performance criteria and can be designated as high-performance sustainable buildings ("sustainable buildings"). This designation provides insights into the effectiveness of GSA's overall efforts to design, construct, and operate buildings in accordance with the

[25]The Buy Clean Task Force was established by Executive Order 14057 to provide recommendations on policies and procedures to expand consideration of embodied emissions and pollutants of construction materials in federal procurement. The Federal Sustainability Plan, released in the same month, announced the administration's intention to launch the Buy Clean Initiative.

guiding principles.[26] Increasing the number of sustainable buildings in the agency's portfolio generally reflects good stewardship and, according to GSA, can lead to improved performance and lower lifecycle costs.[27] In 2018, GSA reported that these sustainable buildings not only used less energy and water and produced less landfilled waste than other buildings in its portfolio, but also cost 23 percent less to operate.

According to GSA, the number of its sustainable buildings increased from 226 to 297 from fiscal years 2018 to 2021.[28] This represents an increase from 24 percent to 31 percent of its eligible owned buildings.[29] As measured by building size, the amount of sustainable gross square footage increased from 35 percent to 44 percent of the total gross square footage of GSA's eligible owned buildings in those 4 years (see fig. 1).[30]

[26]GSA officials stated that the *Guiding Principles for Sustainable Federal Buildings* have been the sole basis for assessing existing GSA-owned buildings for this designation since 2016. For new buildings and those undergoing major modernization projects, they said that earning third-party LEED certification is the primary way to gain this designation.

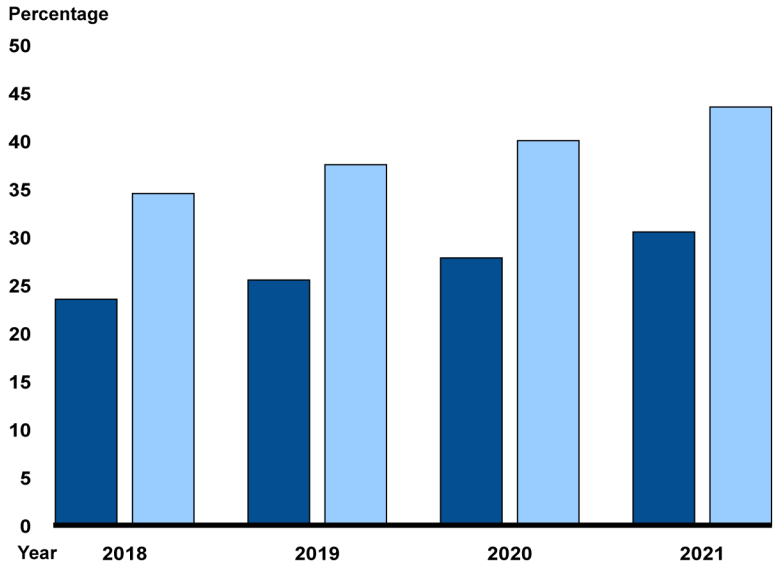
[27]The majority of GSA buildings designated as sustainable have been existing buildings rather than new construction or major modernization. In May 2023, GSA officials said that fiscal year 2022 data shows that 84 percent of its sustainable buildings were existing buildings that had gained the designation, while 16 percent were either new buildings built in compliance with the guiding principles or buildings that had undergone a major modernization project.

[28]At the time of this review, 2021 was the most recent year for which data was available.

[29]GSA officials said that GSA-owned buildings 10,000 gross square feet or larger are eligible for the sustainable designation.

[30]GSA data show that the total gross square footage of the buildings designated as sustainable increased from 76.4 million to 98.0 million from fiscal years 2018 to 2021. These data also show that the total gross square footage of all buildings eligible for assessment consideration increased from 221.7 million to 225.4 million in this 4-year period.

Figure 1: Percentage, Number, and Gross Square Footage of GSA-Owned Buildings Designated as Sustainable, Fiscal Years 2018-2021



	2018		2019		2020		2021	
Total number of sustainable buildings	226	-	245	-	269	-	297	-
Total sustainable gross square feet (in millions)	-	76.4	-	83.7	-	89.9	-	98.0

Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Data for Figure 1: Percentage, Number, and Gross Square Footage of GSA-Owned Buildings Designated as Sustainable, Fiscal Years 2018-2021

Year	Percentage of eligible owned buildings	Total number of sustainable buildings	Percentage of eligible owned gross square feet	Total sustainable gross square feet (in millions)
2018	23.5	226	34.5	76.4
2019	25.5	245	37.5	83.7
2020	27.8	269	40	89.9
2021	30.5	297	43.5	98.0

Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Note: GSA officials noted that eligible buildings are those 10,000 gross square feet or larger.

GSA Has Reported Progress across Its Buildings Portfolio in Key Sustainability Areas since Fiscal Year 2018

GSA has reported making overall progress relative to a series of key sustainability metrics across its buildings portfolio. GSA aggregates data from its buildings pertaining to these metrics and provides portfolio-level data to OMB and CEQ as a part of its annual sustainability scorecard.[31] Following are descriptions of GSA's performance in relation to these sustainability metrics. Appendix II provides more detailed information about GSA's performance relative to some of these metrics.

- **Energy efficiency.** GSA has improved its energy use efficiency (Btu[32] per square foot) since fiscal year 2018 and, since fiscal year 2020, has surpassed its prior goal for reduction in energy use that was based upon a 2003 baseline.[33] GSA reported a 4.3 percent decrease in energy use per square foot in fiscal year 2020 compared with fiscal year 2019. GSA central office officials said this decrease was due, in part, to reduced building occupancy during the COVID-19 pandemic;[34] GSA then reported energy use in fiscal year 2021 similar to fiscal year 2020. Moving forward, in accordance with the implementation instructions for Executive Order 14057, like other agencies, GSA will set annual targets for further improvements in energy efficiency that are no longer tied to the prior 2003 baseline.[35]

[31]CEQ makes these annual scorecards available on its sustainability.gov website.

[32]A British thermal unit (Btu) is a measure of the heat content of fuels or energy sources. It is the quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature that water has its greatest density (approximately 39 degrees Fahrenheit).

[33]Section 102 of Energy Policy Act of 2005 established a 2003 baseline for energy reduction and established goals through fiscal year 2015. 42 U.S.C. § 8253(a). Additional reduction goals have been implemented through subsequent executive orders.

[34]These officials stated that the COVID-19 pandemic had mixed impacts on the agency's energy use. For example, while reduced building occupancy lessened energy demand, a protocol to more frequently operate building ventilation equipment as a COVID mitigation measure heightened energy demand.

[35]The implementation instructions for Executive Order 14057 state that the metric will remain British thermal units (Btu) consumed per gross per foot, reported each fiscal year. GSA is to set new energy use intensity targets beginning in fiscal year 2023.

- **Water efficiency.** GSA has gradually improved its water use efficiency (gallons per square foot) since 2018, having previously surpassed its prior goal of a 20 percent reduction from 2007 levels.[36] GSA's reported aggregate water use of 8.9 gallons per square foot in fiscal year 2021 represents a 39.2 percent reduction compared to the 2007 baseline. GSA central office officials stated that reduced building occupancy during the COVID-19 pandemic contributed to the reduction observed in 2021. Moving forward, in accordance with the implementation instructions for Executive Order 14057, GSA, like other agencies, is to propose a goal for water use efficiency for fiscal year 2030 and identify annual progress goals for the interim.[37]
- **Waste management and diversion.** GSA has reported diverting a majority of the waste generated at its owned buildings away from landfill and toward recycling programs in recent editions of its sustainability plan that included these data.[38] In fiscal years 2018 and 2019, GSA reported diverting 64 percent of the non-hazardous solid waste generated across its owned buildings portfolio. In those same years, GSA reported a decrease in total waste generated, from 46,700 to 39,300 metric tons.[39]
- **Greenhouse gas emissions reduction.** GSA steadily reduced its Scope 1 and 2 greenhouse gas emissions in recent years and, in fiscal year 2021, reached a key reduction milestone relative to a 2008 baseline. GSA's reported 51 percent emissions reduction in 2021 relative to the 2008 baseline is the first year that it surpassed the 50 percent reduction target set by Executive Order 14057, which was

[36]Executive Orders 13423 and 13693 each required a 2 percent reduction in water consumption intensity per fiscal year compared to a fiscal year 2007 baseline, leading to a collective 20 percent reduction goal before Executive Order 13693 was revoked. Although the requirements of these orders are no longer in effect, the baseline and 20 percent reduction are still reflected in OMB's annual scorecards. Exec. Order No. 13423, 72 Fed. Reg. 3919 (Jan. 26, 2007) (revoked by Exec. Order 13693); Exec. Order No. 13693, 80 Fed. Reg. 15871 (Mar. 25, 2015) (revoked by Exec. Order No. 13834, 83 Fed. Reg. 23771 (May 22, 2018)).

[37]The implementation instructions for Executive Order 14057 state that the metric will remain gallons of potable water used per gross square foot per fiscal year.

[38]OMB's sustainability scorecard does not include information on solid waste generation. GSA collects data on its waste management and diversion efforts and reports this information in its Sustainability Report and Implementation Plan.

[39]Fiscal years 2018 and 2019 are the most recent years for which GSA published waste management and diversion data in its Sustainability Report and Implementation Plan.

issued in December 2021.[40] Going forward, this order shifts the focus away from reductions relative to past emissions and toward the new goal of net-zero building emissions by 2045. GSA central office officials told us that they will continue to report on Scope 1 and 2 emissions across GSA's buildings portfolio relative to the 2008 baseline.[41]

- **Renewable electricity share.** At least 7.5 percent of the electricity GSA used in recent years came from renewable sources, exceeding federal requirements.[42] From fiscal years 2018 to 2021, GSA reported that at least 11 percent—and as much as 19 percent—of the electricity used across its buildings portfolio came from renewable sources. Moving forward, this reporting will track GSA's progress toward the new government-wide goal for agencies to use 100 percent carbon-free electricity (i.e., electricity from power sources that generate no carbon emissions such as solar, wind, and nuclear) by 2030.[43]

GSA Is Collaborating with CEQ to Develop New Federal Procurement Emissions Metrics

GSA is coordinating with CEQ to develop the metrics necessary to track progress toward the new government-wide goal of net-zero emissions from procurement of products and services. Executive Order 14057

[40]The 51 percent reduction from 2008 to 2021 represents a 1.1 million ton decrease in greenhouse gas emissions. The 2008 baseline was originally set in Executive Order 13514. Although since revoked, OMB continues to use the 2008 baseline in reporting progress on its scorecards. Exec. Order No. 13514, 74 Fed. Reg. 52117 (Oct. 8, 2009) (revoked by Exec. Order No. 13693); Exec. Order No. 13693, 80 Fed. Reg. 15869 (Mar. 25, 2015) (revoked by Exec. Order No. 13834 (2018)).

[41]The implementation instructions for Executive Order 14057 state that, consistent with sections 102 and 202 of the order and the approach taken under previous executive orders, GSA will be required to measure Scope 1 and 2 reductions against a fiscal year 2008 baseline.

[42]42 U.S.C. § 15852(a)(2). For this requirement, renewable energy is defined as marine energy or electric energy produced from solar, wind, biomass, landfill gas, geothermal, municipal solid waste, or new hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project.

[43]Section 102(a)(i) of Executive Order No. 14057, 86 Fed. Reg. at 70935. Not all renewable energy is carbon-free, and not all carbon-free energy is renewable. For example, nuclear energy is carbon-free but not renewable, and biofuels are a renewable energy source but not necessarily carbon-free.

creates the need for agencies to quantify their Scope 3 emissions to track progress toward a goal of net-zero emissions from federal procurement by 2050.[44] The implementation instructions for the executive order state that GSA, in coordination with CEQ and OMB, is to assess systems and methodologies to track and report Scope 3 emissions.[45] These instructions also state that GSA, in coordination with CEQ and OMB, is to develop tools to establish baselines and assist agencies in setting individual Scope 3 emissions reduction goals for the coming years.

As it develops tools to help agencies set their respective Scope 3 emissions baselines, GSA central office officials told us they are focusing on opportunities within sectors where the most data are available, such as building materials and travel services.[46] These officials told us that they are working to determine how they can aggregate data to estimate the emissions from these sectors to develop a composite metric. They added that they expect to finalize fiscal year 2022 baseline quantities for these new Scope 3 emissions metrics in fiscal year 2023, and that they will continue to gather additional data from federal contractors to improve the accuracy of their estimates in the coming years.

GSA Officials Cited Capital Access and Limited Market Options as Key Challenges in Meeting Future Sustainability Goals

[44]Scope 3 emissions are those resulting from activities from assets not owned or controlled by the agency (e.g., purchased goods and services).

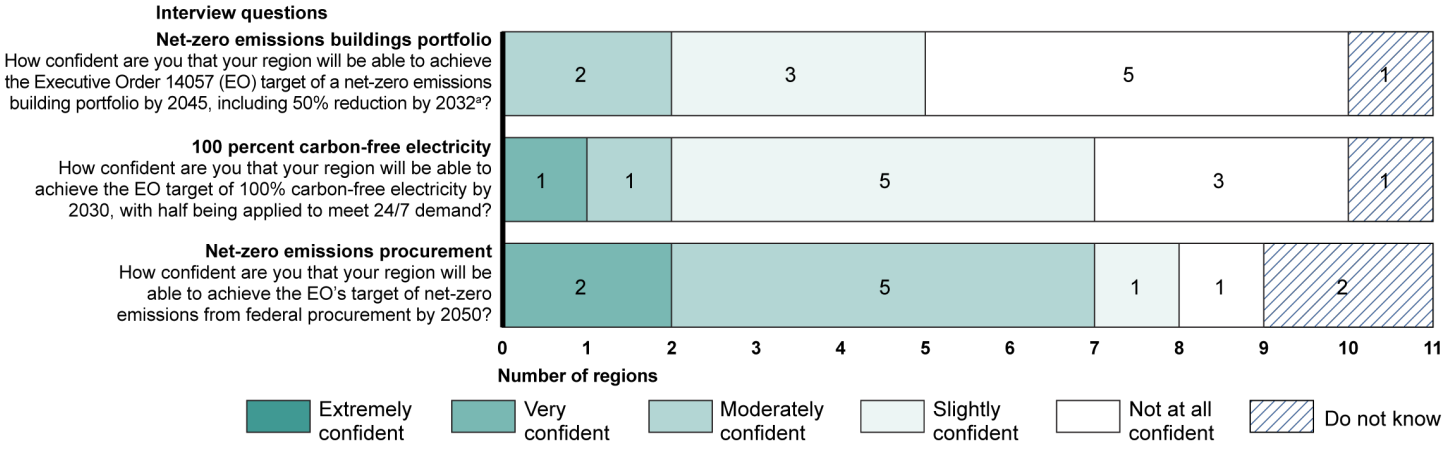
[45]The instructions state that, in assessing systems and methodologies, agencies are to take into account the availability of data, the different categories of Scope 3 emissions, the scale of Scope 3 emissions in relation to total emissions, and the potential to use data to inform emissions reductions strategies.

[46]GSA central office officials cited building materials that comply with federal lower embodied carbon requirements and travel services such as airline flights and rental cars as examples of areas of current focus. These officials said that current methodologies involve estimation based on national average greenhouse gas emission intensity.

GSA Officials Said Insufficient Capital Will Limit Ability to Achieve Net-Zero Building Emissions

Officials from nearly all GSA regions expressed little confidence in their ability to achieve future federal goals for net-zero building emissions. In particular, eight of 11 GSA regions reported being either “not at all confident” or “slightly confident” that they will be able to achieve the new goal of net-zero building emissions by 2045, as shown in figure 2.

Figure 2: Responses of GSA Regional Officials to GAO Questions about Federal Sustainability Goals Set by Executive Order 14057



Source: GAO analysis of General Services Administration regional officials’ responses to structured interview questions. | GAO-23-105905

Data for Figure 2: Responses of GSA Regional Officials to GAO Questions about Federal Sustainability Goals Set by Executive Order 14057

Interview questions	Extremely confident	Very confident	Moderately confident	Slightly confident	Not at all confident	Do not know
Net-zero emissions buildings portfolio How confident are you that your region will be able to achieve the Executive Order 14057 (EO) target of a net-zero emissions building portfolio by 2045, including 50% reduction by 2032a?	0	0	2	3	5	1
100 percent carbon-free electricity How confident are you that your region will be able to achieve the EO target of 100% carbon-free electricity by 2030, with half being applied to meet 24/7 demand?	0	1	1	5	3	1
Net-zero emissions procurement How confident are you that your region will be able to achieve the EO’s target of net-zero emissions from federal procurement by 2050?	0	2	5	1	1	2

Source: GAO analysis of General Services Administration regional officials’ responses to structured interview questions. | GAO-23-105905

[a]In April 2022, GSA reported it had achieved the interim goal of a 50 percent reduction in greenhouse gas emissions by 2032, compared with a 2008 emissions baseline.

GSA central office officials said that achieving net-zero building emissions will require major projects in many existing buildings to replace fossil fuel-based equipment such as water heaters and boilers used for space heating. These projects would replace fossil fuel-based systems with electrically operated systems as part of GSA's building electrification efforts. These officials said they are currently evaluating building electrification approaches in conjunction with deep energy retrofits that increase energy efficiency as the primary means to achieve the new net-zero emissions goal. In the near term, officials estimate that GSA will need to conduct such projects in at least 46 existing facilities to meet the interim goal set by the *Federal Building Performance Standard* for agencies to achieve zero Scope 1 emissions in 30 percent of their buildings by 2030.[47]

Officials from all 11 GSA regions cited the need for capital as a key barrier to their ability to pursue the major projects described above. Many of these regional officials told us that they have previously completed low-cost, high-benefit projects to improve energy efficiency in their portfolios. For example, officials from most GSA regions said they have completed smaller, low-cost projects such as the installation of energy-efficient LED lighting in existing buildings. However, these officials said that they are concerned that limited access to capital and competition for the limited capital among different projects will inhibit their ability to undertake the projects needed to make further improvements. Officials from one GSA region said, for example, that they lack the budget needed to pursue large-scale projects associated with electrification and emissions reduction. Relatedly, officials from another region said that these would be prospectus-level projects; we have previously reported that these projects face months-long review times and limited funding, making them

[47]The *Federal Building Performance Standard* requires agencies to cut energy use and electrify equipment and appliances to achieve zero Scope 1 emissions in 30 percent of the building space owned by the Federal government by square footage by 2030. GSA officials estimate that the agency will need to conduct such projects in at least 46 facilities (totaling about 32 million gross square feet) of its 151 applicable facilities (totaling about 109 million gross square feet) by 2030 to meet this goal.

difficult to complete.[48] These concerns are consistent with those of the Green Building Advisory Committee's Federal Building Decarbonization Task Group, which has identified capital access and investment barriers as key challenges associated with efforts to reduce emissions at federal facilities. Officials from GSA's central office said that, while it is premature to estimate the amount of capital needed to achieve net-zero building emissions, the scale and scope of projects necessary will require a level of resources beyond what has historically been available to GSA.

To mitigate this capital access challenge, GSA has focused on using energy savings performance contracts to fund major projects focused on energy efficiency and building electrification. For example, GSA central office officials told us that the agency awarded four contracts in fiscal year 2022 for such projects at 39 buildings, totaling 11.7 million gross square feet.

However, these officials also acknowledged that the focus on emissions reduction through electrification can complicate the use of these contracts. For example, they said that including emissions reduction elements (e.g., replacing fossil fuel-based equipment with electric equipment) in an energy savings performance contract may result in a situation where the higher up-front costs are not sufficiently offset by future energy savings. While such a project could be effective in reducing a building's emissions, it may not produce enough energy savings to make such a contract economically viable. The Green Building Advisory Committee's Federal Building Decarbonization Task Group similarly acknowledged the challenge of showing the economic viability of emissions-reduction projects when it reported that justifying

[48]The Public Buildings Act of 1959, as amended, requires GSA to submit for congressional authorization a proposal (prospectus) for capital and lease projects with an estimated cost that exceeds a certain dollar threshold. 40 U.S.C. § 3307. In 2022, we reported that GSA identified challenges with the prospectus process such as months-long review times and limited funding that make it difficult to complete needed projects. GAO, *Federal Real Property: GSA Should Fully Assess Its Prospectus Process and Communicate Results to Its Authorizing Committees*, GAO-22-104639 (Washington, D.C., Jan. 21, 2022).

appropriations for such projects can be difficult because they often offer low economic returns.[49]

Officials from six of the 11 GSA regions said they believe it will be either "extremely challenging" or "very challenging" to enter into additional energy savings performance contracts because they have often proven difficult to justify financially.[50] Moving forward, according to GSA central office officials, conditions may dictate that GSA more regularly provide upfront funding when entering into energy savings performance contracts to make them economically viable for the participating contractors. In one example, these officials said the agency made an $8 million up-front payment on such a contract for a $97 million retrofit project to reduce the contract's payback period to within allowed limits. These officials further said that they are encouraging regions to consider whether they can use resources provided through the Inflation Reduction Act in combination with other funding sources to finance energy savings performance contracts.[51]

GSA Officials Cited Limited Availability of Carbon-Free Electricity and Sustainable Materials as Key Challenges for Meeting Government-Wide Goals

Limited Availability of Carbon-Free Electricity

Officials from most GSA regions expressed little confidence in their ability to achieve new federal carbon-free electricity goals due to the limited market of suppliers at the time of our review. This presents a challenge

[49]In its April 2022 Advice Letter to GSA, the Green Building Advisory Committee noted the difficulty of justifying appropriations for projects having low economic returns even where there is strong carbon emission reduction. In particular, the committee observed that emission reductions do not currently provide any income or value stream and that these reductions cannot be factored into assessments or monetized through energy savings performance contracts.

[50]Another four regions said that this will be "moderately challenging" moving forward. For a summary of results from interviews with GSA regional officials, see appendix III.

[51]The Inflation Reduction Act provided GSA with $250 million for measures that, among other things, reduce energy, water, and material resource use; reduce air and water pollution and waste generation; and increase the use of environmentally preferable products. These funds can be used in conjunction with performance contracts related to these measures.

not only to GSA's efforts to achieve the goal of operating on 100 percent carbon-free electricity by 2030, but also to its efforts to achieve a net-zero emissions buildings portfolio. CEQ has stated that carbon-free electricity, combined with improved efficiency and electrification, is critical to reducing existing facilities' emissions and achieving a net-zero emissions buildings portfolio. However, eight of 11 GSA regions reported being "not at all confident" or "slightly confident" they will achieve the goal of 100 percent carbon-free electricity use by 2030 (as shown in fig. 2 above). While the U.S. Energy Information Administration (EIA) reported that 40 percent of the electricity generated across the country was from carbon-free sources in 2022, officials from more than half of GSA's regional offices reported having limited access to suppliers of carbon-free electricity.[52] In addition, some of these officials said that they must pay a premium to purchase carbon-free electricity. Higher prices for purchased electricity can create increased operating costs that GSA regions then have to balance with other building expenses.

In response to these conditions, GSA created a new division in August 2022 to focus on the procurement of carbon-free electricity and other clean energy sources.[53] GSA central office officials said this division is conducting market research and coordinating with CEQ to support interagency coordination and identify areas in which large, multi-agency purchases of carbon-free electricity could be made to lower costs. These officials added that this new division recently led the development of a plan that outlines the agency's goals for fiscal years 2023 and 2024, as well as other initiatives related to the agency's long-term carbon-free electricity goals.

Limited Market for Sustainable Materials

GSA regional officials expressed relative confidence in their ability to achieve the long-term government-wide goal of net-zero emissions

[52]According to EIA, in 2022, about 4.24 trillion kilowatt hours of electricity were generated at U.S. utility-scale electricity generation facilities, and an additional 58 billion kWh were generated from small-scale photovoltaic systems. EIA noted that about 22 percent of this electricity was from renewable energy sources, about 18 percent was from nuclear energy, and about 60 percent was from fossil fuels. Energy Information Administration, "*What is U.S. electricity generation by energy source?,*" accessed Apr. 24, 2023, https://www.eia.gov/tools/faqs/faq.php?id=427&t=3.

[53]GSA central office officials said that this new division is comprised of contracting officers, contracting support, subject matter experts, program management staff, and multiple management support contractors.

federal procurement. However, at the same time, they expressed concern about the limited market for sustainable products and services such as construction materials with low amounts of embodied carbon. As shown in figure 2, officials from seven of GSA's 11 regional offices said that they are either "very" or "moderately" confident they will achieve the goal of net-zero emissions federal procurement by 2050. Achieving this goal will be challenging, however, because it will require effort outside of GSA's immediate control to reduce its Scope 3 emissions (i.e., those resulting from activities associated with assets not owned or controlled by GSA, such as purchased goods and services).

Some GSA regional officials told us that they are currently constrained by the limited extent to which sustainable materials are available to purchase. Specifically, they explained that acquiring sustainable building materials used in the construction, maintenance, and operations of their buildings remains difficult, especially in more rural areas. As a result, some regions said that sourcing these materials can be time-consuming and costly, and may not be economically viable for use on smaller projects. GSA central office officials said that they are coordinating with regions to provide updates on relevant guidance and discuss these challenges during their regular meetings.

Officials from GSA's central office said achieving the goal of net-zero emissions by 2050 from the agency's purchases of products and services in support of its buildings—requiring the tracking and reduction of emissions associated with its buildings portfolio—will be a significant challenge. In addressing this challenge, these officials emphasized the importance of carbon offsets.[54] They said that, without the ability to purchase and apply carbon offsets to the measurement of Scope 3 emissions, achieving this goal would require the elimination of greenhouse gas emissions associated with the production and distribution of every product and service procured by GSA. These officials stressed

[54]A carbon offset can be defined as a measurable reduction of greenhouse gas emissions from an activity or project in one location that is used to compensate for emissions occurring elsewhere. For example, a manufacturer might offset its emissions by funding an external project that captures methane, a greenhouse gas emitted from agricultural sources and landfills. The emissions reduced, avoided, or sequestered by such projects are collectively termed carbon offsets, though they may involve different greenhouse gases. GAO, *Carbon Offsets: The U.S. Voluntary Market is Growing, but Quality Assurance Poses Challenges for Market Participants*, GAO-08-1048 (Washington, D.C., Aug. 29, 2008).

that this is a largely unrealistic task that would essentially require full decarbonization of large sectors of the U.S. and global economy.

Further, GSA central office officials said the ongoing work to establish metrics that allow agencies to reliably attribute Scope 3 emissions to individual products and services purchased will be difficult. GSA has previously reported aggregate data on total dollars spent through contracts containing sustainability clauses as a proxy measure of sustainable procurement. However, GSA acknowledged that these data are not actionable and may not correlate with desired outcomes.[55] Moving forward, to track progress toward the 2050 goal of net-zero emissions federal procurement, these officials said that it is likely that GSA and other agencies will rely upon a composite metric, derived from averages associated with categories of products and services and aggregation of large volumes of data across industries. GSA central office officials said that a composite metric would help identify areas of purchasing with the greatest emissions impacts and opportunities for reduction. However, they noted that this metric may not immediately reflect specific actions taken by agencies or individual programs to purchase lower-emissions products and services, due to the large volumes of industry data that need to be used to arrive at the averages.[56]

Agency Comments

We provided a draft of this report to GSA and CEQ for review and comment. GSA and CEQ provided technical comments that we incorporated, as appropriate.

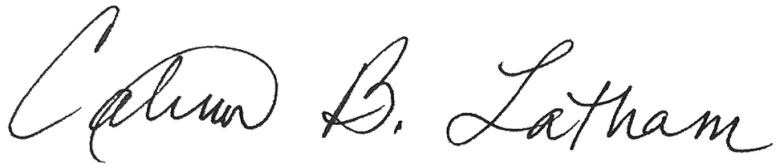
We are sending copies of this report to the appropriate congressional committees, the Administrator of GSA, CEQ, and other interested parties. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or lathamc@gao.gov. Contact points for our Offices

[55]In recent years, GSA has provided aggregate data on its procurement of goods and services to OMB for inclusion in the agency's annual sustainability scorecard.

[56]GSA central office officials also cited the challenge of hiring personnel to work on this issue. Officials said that it has been difficult to hire personnel who specialize in considering Scope 3 emissions because those with these unique skills are generally already employed in more lucrative roles in the private sector.

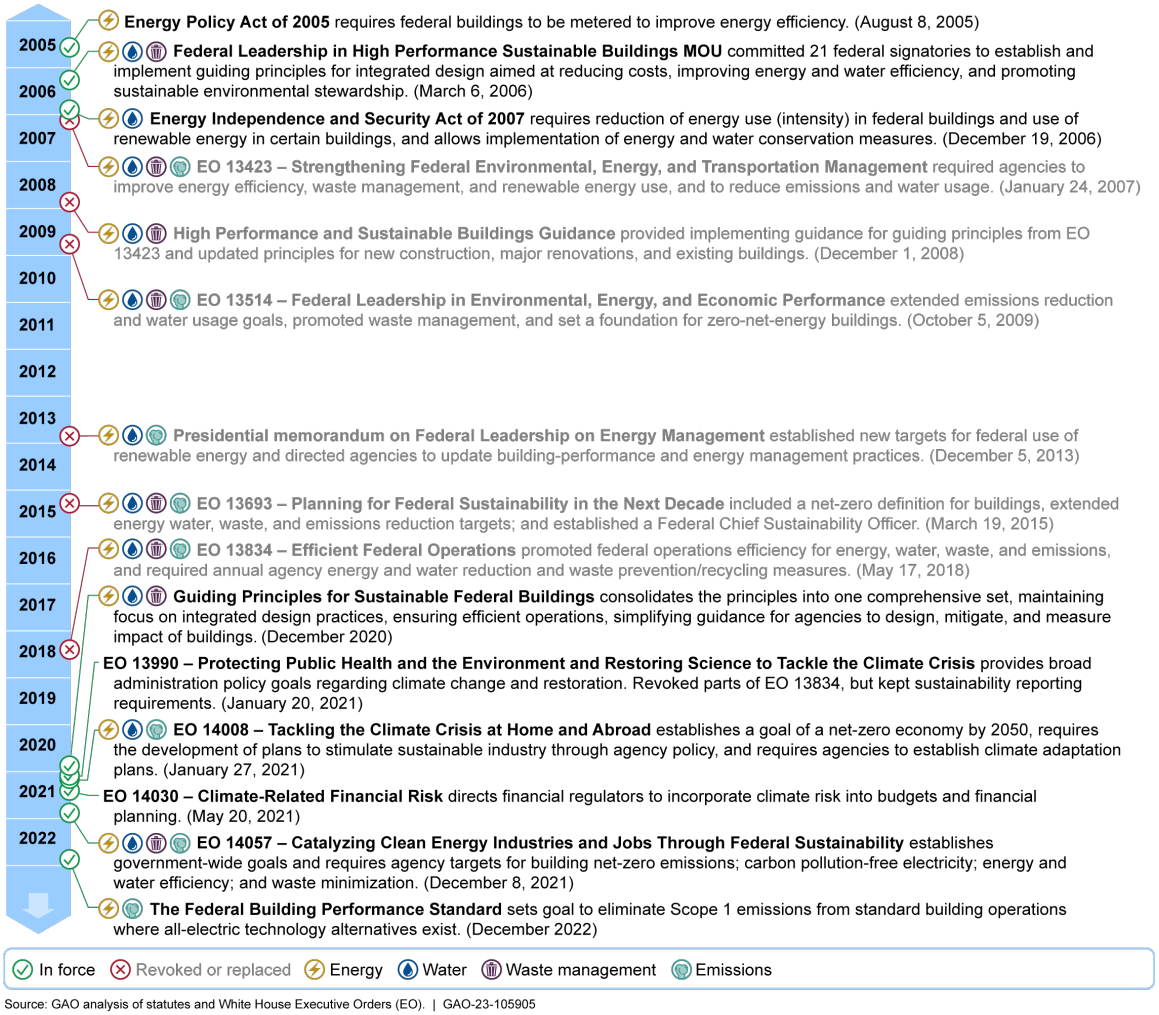
of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Catina Latham, Director
Physical Infrastructure Issues

Appendix I: Key Laws and Executive Orders Related to Federal Building Sustainability, 2005 to 2022

Figure 3: Selected Federal Sustainability Legal Requirements and Executive Orders since 2005



Source: GAO analysis of statutes and White House Executive Orders (EO). | GAO-23-105905

Text for Figure 3: Selected Federal Sustainability Legal Requirements and Executive Orders since 2005

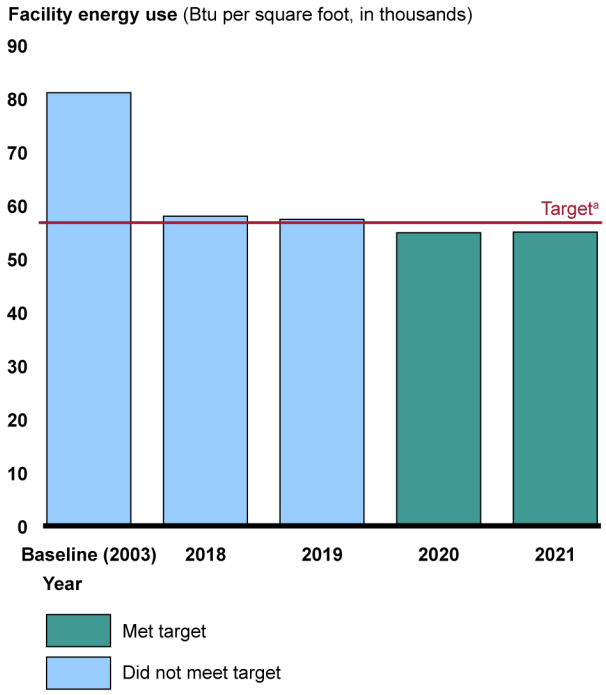
Status	Areas	Summary
In force	Energy	**Energy Policy Act of 2005** requires federal buildings to be metered to improve energy efficiency. (August 8, 2005)
In force	Energy, Water, Waste management	**Federal Leadership in High Performance Sustainable Buildings MOU** committed 21 federal signatories to establish and implement guiding principles for integrated design aimed at reducing costs, improving energy and water efficiency, and promoting sustainable environmental stewardship. (March 6, 2006)
In force	Energy, Water	**Energy Independence and Security Act of 2007** requires reduction of energy use (intensity) in federal buildings and use of renewable energy in certain buildings, and allows implementation of energy and water conservation measures. (December 19, 2006)
Revoked or replaced	Energy, Water, Waste management, Emissions	EO 13423 – Strengthening Federal Environmental, Energy, and Transportation Management required agencies to improve energy efficiency, waste management, and renewable energy use, and to reduce emissions and water usage. (January 24, 2007)
Revoked or replaced	Energy, Water, Waste management	High Performance and Sustainable Buildings Guidance provided implementing guidance for guiding principles from EO 13423 and updated principles for new construction, major renovations, and existing buildings. (December 1, 2008)
Revoked or replaced	Energy, Water, Waste management, Emissions	EO 13514 – Federal Leadership in Environmental, Energy, and Economic Performance extended emissions reduction and water usage goals, promoted waste management, and set a foundation for zero-net-energy buildings. (October 5, 2009)
Revoked or replaced	Energy, Water, Emissions	Presidential memorandum on Federal Leadership on Energy Management established new targets for federal use of renewable energy and directed agencies to update building-performance and energy management practices. (December 5, 2013)
Revoked or replaced	Energy, Water, Waste management, Emissions	EO 13693 – Planning for Federal Sustainability in the Next Decade included a net-zero definition for buildings, extended energy water, waste, and emissions reduction targets; and established a Federal Chief Sustainability Officer. (March 19, 2015)
Revoked or replaced	Energy, Water, Waste management, Emissions	EO 13834 – Efficient Federal Operations promoted federal operations efficiency for energy, water, waste, and emissions, and required annual agency energy and water reduction and waste prevention/recycling measures. (May 17, 2018)
In force	Energy, Water, Waste management	**Guiding Principles for Sustainable Federal Buildings** consolidates the principles into one comprehensive set, maintaining focus on integrated design practices, ensuring efficient operations, simplifying guidance for agencies to design, mitigate, and measure impact of buildings. (December 2020)
In force	NA	**EO 13990 – Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis** provides broad administration policy goals regarding climate change and restoration. Revoked parts of EO 13834, but kept sustainability reporting requirements. (January 20, 2021)
In force	Energy, Water, Emissions	**EO 14008 – Tackling the Climate Crisis at Home and Abroad** establishes a goal of a net-zero economy by 2050, requires the development of plans to stimulate sustainable industry through agency policy, and requires agencies to establish climate adaptation plans. (January 27, 2021)
In force	NA	**EO 14030 – Climate-Related Financial Risk** directs financial regulators to incorporate climate risk into budgets and financial planning. (May 20, 2021)

Status	Areas	Summary
In force	Energy, Water, Waste management, Emissions	**EO 14057 – Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability** establishes government-wide goals and requires agency targets for building net-zero emissions; carbon pollution-free electricity; energy and water efficiency; and waste minimization. (December 8, 2021)
In force	Energy, Emissions	The Federal Building Performance Standard sets goal to eliminate Scope 1 emissions from standard building operations where all-electric technology alternatives exist. (December 2022)

Source: GAO analysis of statutes and White House Executive Orders (EO). | GAO-23-105905

Appendix II: General Services Administration's Reported Progress in Key Sustainability Areas, Fiscal Years 2018 to 2021

Figure 4: Energy Use of GSA's Owned-Buildings Portfolio Compared to 2003 Baseline, Fiscal Years 2018-2021



Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Data for Figure 4: Energy Use of GSA's Owned-Buildings Portfolio Compared to 2003 Baseline, Fiscal Years 2018-2021

Year	Facility Energy Use (Btu/Sq Ft)
Baseline (2003)	81060
2018	57948
2019	57340
2020	54868
2021	54973

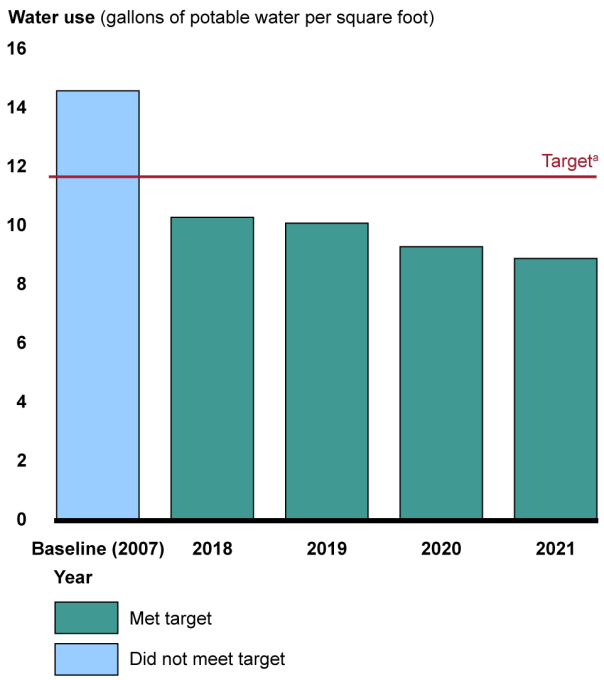
Year	Facility Energy Use (Btu/Sq Ft)
Target	56742

Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Note: GSA officials stated that the COVID-19 pandemic had mixed impacts on the agency's energy use. While reduced building occupancy during the pandemic resulted in reductions in energy use, much of the decrease was offset by mitigation efforts (e.g., ventilation improvements) that resulted in increased energy use.

[a]The target line represents a 30 percent reduction from the 2003 baseline. Section 102 of *Energy Policy Act of 2005* established a 2003 baseline for energy reduction as well as goals through Fiscal Year 2015. 42 U.S.C. § 8253(a).

Figure 5: Total Water Use Intensity of GSA's Owned Buildings Portfolio Compared to 2007 Baseline, Fiscal Years 2018-2021



Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Data for Figure 5: Total Water Use Intensity of GSA's Owned Buildings Portfolio Compared to 2007 Baseline, Fiscal Years 2018-2021

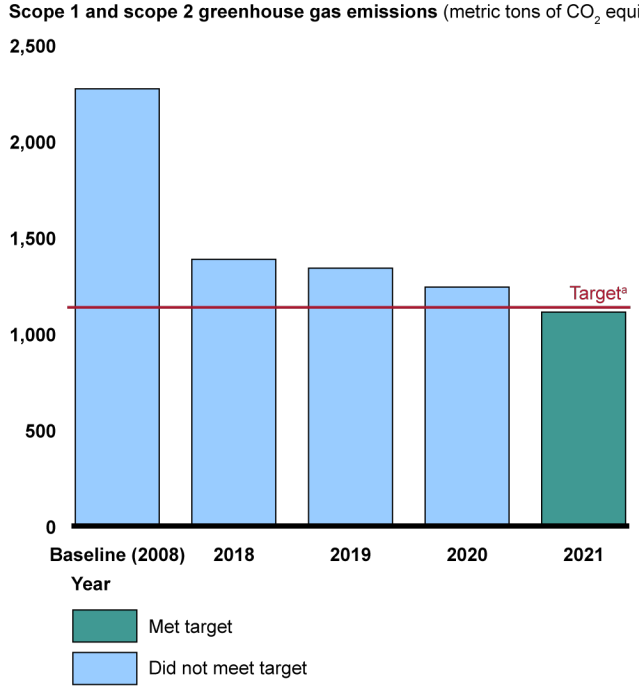
Year	Water use (gallons of potable water per square foot)
Baseline (2007)	14.6
2018	10.3
2019	10.1
2020	9.3
2021	8.9
Target	11.7

Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Note: GSA officials stated that the COVID-19 pandemic contributed to a further decrease in water use due to reduced building occupancy.

[a]The target line represents a 20 percent reduction from the 2007 baseline. Executive Orders 13423 and 13693 each required a 2 percent reduction in water consumption intensity per fiscal year compared to a fiscal year 2007 baseline, leading to a collective 20 percent reduction goal before Executive Order 13693 was revoked. Although the requirements of these executive orders are no longer in effect, the baseline and 20 percent reduction are still reflected in OMB's annual scorecards. Exec. Order No. 13423, 72 Fed. Reg. 3919 (Jan. 26, 2007) (revoked by Exec. Order 13693); Exec. Order No. 13693, 80 Fed. Reg. 15871 (Mar. 25, 2015) (revoked by Exec. Order 13834, 83 Fed. Reg. 23771 (May 22, 2018)).

Figure 6: Scope 1 and Scope 2 Greenhouse Gas Emissions from GSA's Owned-Buildings Portfolio Compared to 2008 Baseline, Fiscal Years 2018-2021



Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Data for Figure 6: Scope 1 and Scope 2 Greenhouse Gas Emissions from GSA's Owned-Buildings Portfolio Compared to 2008 Baseline, Fiscal Years 2018-2021

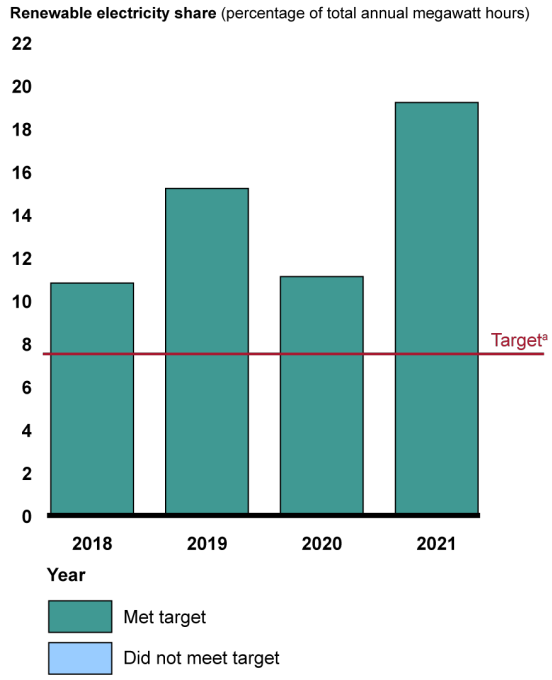
Year	Scope 1 and scope 2 greenhouse gas emissions (metric tons of CO2 equivalent, in thousands)
Baseline (2008)	2271
2018	1385
2019	1339
2020	1241
2021	1111
Target	1135.5

Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Note: GSA officials stated that the COVID-19 pandemic had mixed impacts on its Scope 1 and Scope 2 emissions. They said that reduced building occupancy resulted in reduced energy consumption—as well as fuel and electricity emissions—but that much of this decrease was offset by mitigation efforts (e.g., ventilation improvements) that resulted in increased energy use.

[a]The target line represents a 50 percent reduction from the 2008 baseline, as required by Executive Order 14057.

Figure 7: Share of Electricity from Renewable Sources Used by GSA's Owned Buildings Portfolio, Fiscal Years 2018-2021



Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Data for Figure 7: Share of Electricity from Renewable Sources Used by GSA's Owned Buildings Portfolio, Fiscal Years 2018-2021

Year	Renewable electricity share (percentage of total annual megawatt hours)
2018	10.8
2019	15.2
2020	11.1
2021	19.2
Target	7.5

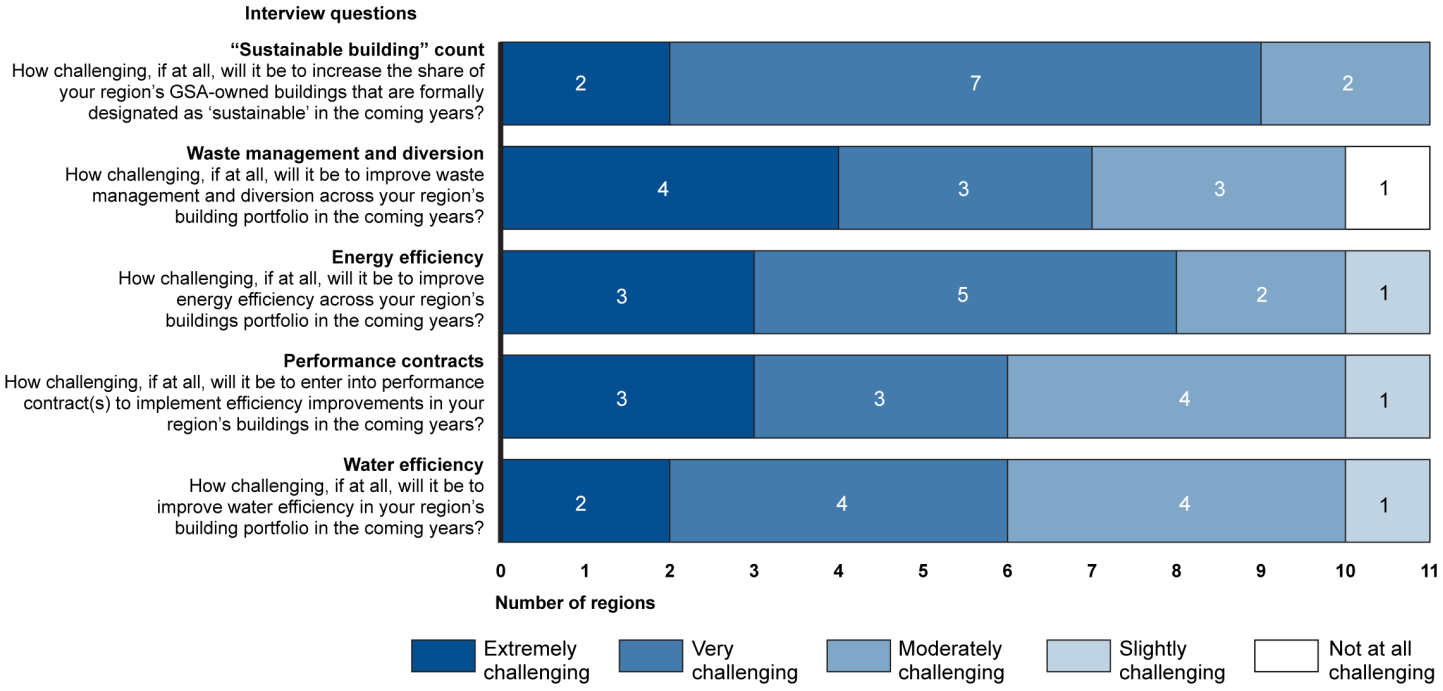
Source: GAO analysis of General Services Administration (GSA) data. | GAO-23-105905

Note: GSA officials stated that the COVID-19 pandemic had a minimal impact on renewable electricity share. According to the officials, while reduced demand and consumption in fiscal year 2020 resulted in a small decrease in total megawatt hours of electricity, the fiscal year 2021 increase in renewable electricity share more than compensated for the overall decrease in electricity consumed across the buildings portfolio.

[a]The target line represents the requirement since 2013 that at least 7.5 percent of the electric energy consumed by the federal government in any fiscal year be from renewable sources. 42 U.S.C. § 15852(a)(3).

Appendix III: Views of General Services Administration Regional Officials' Views on Sustainability Initiatives and Goals

Figure 8: Summary of Responses from Interviews with Officials from 11 GSA Regional Offices



Source: GAO analysis of interviews with General Services Administration (GSA) regional officials. | GAO-23-105905

Data for Figure 8: Summary of Responses from Interviews with Officials from 11 GSA Regional Offices

Interview questions	Extremely challenging	Very challenging	Moderately challenging	Slightly challenging	Not at all challenging
"Sustainable building" count How challenging, if at all, will it be to increase the share of your region's GSA-owned buildings that are formally designated as 'sustainable' in the coming years?	2	7	2	0	0

Interview questions	Extremely challenging	Very challenging	Moderately challenging	Slightly challenging	Not at all challenging
Waste management and diversion How challenging, if at all, will it be to improve waste management and diversion across your region's building portfolio in the coming years?	4	3	3	0	1
Energy efficiency How challenging, if at all, will it be to improve energy efficiency across your region's buildings portfolio in the coming years?	3	5	2	1	0
Performance contracts How challenging, if at all, will it be to enter into performance contract(s) to implement efficiency improvements in your region's buildings in the coming years?	3	3	4	1	0
Water efficiency How challenging, if at all, will it be to improve water efficiency in your region's building portfolio in the coming years?	2	4	4	1	0

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the contact named above, Mike Armes (Assistant Director), Chad Williams (Analyst-in-Charge), John Bauckman, Emily Crofford, Josh Ormond, Steve Rabinowitz, Christina Shaw, Jack Wang, Michelle Weathers, Gregory Wong, and Elizabeth Wood made key contributions to this report.

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