

The Climate Is Right for Green

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The political, social, and scientific climate couldn't be more favorable for investing in green federal buildings. Agencies are ramping up their commitment, and with funding now available, action is a step away.

At times during the last eight years it seemed as though proposed actions to address global warming could not secure a foothold. With recent court rulings, presidential appointments and commitments, and public sector investments, there is now enough traction to create whiplash. Alongside billions in new green stimulus funding, the Environmental Protection Agency (EPA) is planning significant new rules for major sources, and the General Services Administration (GSA) and Department of Energy (DOE) are ramping up green building requirements, policies, and technical capacity. As the current administration faces global warming head on, green public construction and retrofitting efforts have begun to sweep the nation.

Why green building?

According to the U.S. Green Building Council (<http://www.usgbc.org/>) buildings in the United States account for a sizable chunk of the nation's resource consumption and carbon dioxide (CO₂) and waste output:

- 72 percent of electricity consumption,
- 39 percent of energy use,
- 38 percent of CO₂ emissions,
- 40 percent of raw materials use,
- 30 percent of waste output (136 million tons annually), and
- 14 percent of potable water consumption.

The reduction in energy use, costs, and greenhouse gas (GHG) emissions is enough reason to initiate green public-sector building efforts, but with that reduction comes the considerable benefit of protecting ecosystems and biodiversity, improving air and water quality, reducing solid waste, and reducing operating costs.

Clearly, to achieve step growth in environmental sustainability and energy independence, the country needs to address buildings of all kinds, but the economic downturn has caused banks to stop financing many construction projects, and the building market has become sluggish. According to the American Institute of Architects, in July 2008, architectural firms employed 224,000 people; by January 2009, that number had fallen 8 percent to 206,000.¹

Despite this slowdown, the number of green building projects is on the rise, and the federal government is recognizing that its impressive number of facilities presents multiple opportunities for such projects. Table 1 gives a breakdown of federal building space,² which translates to approximately 445,000 federal facilities with a total floor space of over 3 billion square feet. The federal government leases another 57,000 buildings comprising 374 million square feet of floor space. As the table shows, the Department of Defense, with over 2 billion square feet, has almost seven times the building space of the U.S. Postal Service and almost an order of magnitude more than GSA.

Inside Track

- The federal government owns more than 400,000 buildings with a total floor space of approximately 3 billion square feet, and it leases another 57,000 buildings. Greening these would make a significant impact.
- Many expect that President Obama will soon release a new executive order with far more aggressive energy efficiency and greenhouse gas reduction goals than previously seen.
- The Leadership in Energy and Environmental Design Green Building Rating System has done much to accelerate the global adoption of sustainable green building by offering a universally accepted set of tools and performance criteria.
- The Department of Energy's Building Technologies Program aims to realize net-zero energy buildings through the use of efficient technologies and on-site power generation.

Table 1. Square footage of federal facilities for which the government purchases energy, by agency.

Federal Agency	Building Space (x 1,000 sq. ft.)	Percentage of Total Building Space
Department of Defense	2,183,665	64.2
U.S. Postal Service	349,547	10.3
General Services Administration	206,534	6.1
Department of Veterans Affairs	156,360	4.6
Department of Energy	102,202	3.0
Department of Justice	59,437	1.7
Department of the Interior	56,086	1.6
Department of Agriculture	55,612	1.6
Department of Transportation	52,732	1.6
Other	177,243	5.3
Total	3,399,418	100

Why are conditions favorable now?

To continue gaining momentum, green building will require political will, significant and continuing funding, a methodology and framework, regulatory drivers, and technical resources for capacity building. Green building concepts have existed for more than a decade, but as Table 2 shows, political support within the federal government, regulatory drivers, and funding for non-defense projects have come about only recently. Technical resources remained limited because the previous lack of funding has prevented widespread transfer and dissemination. Now with an aggressive administration, agencies ramping up their capacity and commitments, and near-term funding available through the stimulus, significant action is imminent.

Political climate

On January 24, 2007, former President George W. Bush signed Executive Order (EO) 13423, which set goals for federal agencies in energy efficiency, acquisition, renewable energy, toxics reduction, recycling, sustainable buildings, electronic stewardship, fleets, and water conservation. The order, which consoli-

Table 2. Conditions for green building. Although the methodology for green building has existed for years, political support, regulatory drivers, and funding have become favorable only recently.

	2007	2008	2009
Political Climate	●	●	●
Regulatory Drivers	●	●	●
Methodology	●	●	●
Funding	●	●	●
Capacity Building	●	●	●

dated several previous EOs, recognized the federal government's responsibility and role in establishing sustainable projects.

Using a 2003 baseline, EO 13423 sought to reduce GHG emissions related to a facility's energy use 30 percent by 2015 and to trim water consumption intensity 2 percent annually through 2015. The order also required that federal agencies undertaking new construction or major renovations to existing structures do so in accordance with the 2006 *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings* set forth in a Memorandum of Understanding (MOU). The Sustainable Buildings MOU created a single, green building standard and set forth leadership goals for the design, construction, operation, and maintenance of high-performance and sustainable federal buildings, including

- employing integrated design principles;
- optimizing energy performance;
- protecting and conserving water resources;
- enhancing indoor environmental quality; and
- reducing the environmental impact of materials.

The signing of EO 13423 and the mandatory adherence to the Sustainable Buildings MOU have effectively increased the number of federal construction projects that implement green building standards, techniques, and materials.³

The current administration promises to build exponentially on the impact of EO 13423 by pushing climate change science, GHG emission reduction, and energy security to the top of its agenda. Indeed, key leaders in these areas have already been appointed. On January 22, 2009, Carol Browner—previously administrator of the EPA during the Clinton administration—became assistant to the president for energy and climate change. On January 23, 2009, Lisa Jackson became head of the EPA. Her long tenure with the agency and her work to reduce GHG emissions while serving as the New Jersey commissioner of environmental protection are of particular interest to those tracking climate change. These appointments telegraph that there will likely be a very close relationship between the White House and EPA.

As the next head of EPA's air office, President Obama has selected Gina McCarthy, a Republican-appointed state official who oversees the Northeast's GHG cap-and-trade program. Environmentalists see the selection as a sign of the administration's intent to move aggressively on climate change regulations ahead of congressional hearings on specific legislation.

Finally, on March 24, 2009, Jonathan Pershing of the World Resources Institute was named as deputy special envoy for climate change, which State Department watchers believe may be the first job designation of its kind.

In light of these appointments and his administration's obvious commitment, many expect that President Obama will soon release a new executive order with far more aggressive energy efficiency and GHG reduction goals than previously seen.

Regulatory drivers

As the sidebar "A Response to Global Warming" describes, the relationship of global warming and human activity is not as questionable as it once was. On April 17, 2009, the EPA signed

A Response to Global Warming

Reports from the Intergovernmental Panel on Climate Change¹ continue to raise the probability that observed increases in mean temperatures do indeed result from human activities. In 2001, when the panel depicted northern hemisphere mean temperature changes over the past millennium, the "hockey stick" graph in Figure A¹ was somewhat controversial. Today the science stands on its own. The political and public debate is no longer focused on the reality of global warming but continues regarding the appropriate response and the level of response. The combination of options under discussion include mitigation to reduce further emissions; adaptation to buffer the impacts caused by warming; and continuing research and application on possible geo-engineering strategies to slow and even reverse global warming.

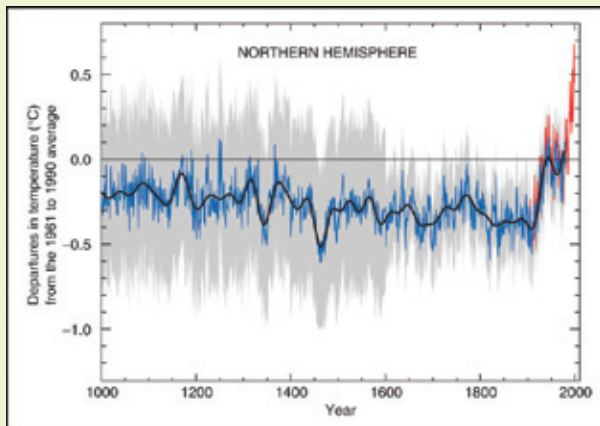


Figure A. Fluctuations from the year 1000 using the 1961–1990 average temperature as a baseline. The blue pattern reflects data from tree rings, coral, ice cores, and historical records. The red pattern reflects data from thermometers. (Figure courtesy of the Intergovernmental Panel on Climate Change, 2001.)

Green building embraces all those options. Reducing energy use consumes fewer fossil fuels and generates fewer greenhouse gas emissions, which significantly addresses the mitigation goal. Creating comfortable, secure, and productive work environments supports adaptation goals. Building or retrofitting "cool" roofs that manage solar radiation by reflecting solar energy is an application of geo-engineering that can help cool the planet.

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1. IPCC, 2001: *Climate Change 2001: The Scientific Basis, Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, J.T. Houghton et al., eds., Cambridge University Press, (Figure A from p. 134).

a proposed finding indicating that CO₂ and five other GHGs pose a threat to public health and welfare because they contribute to climate change. The agency had been under order from the U.S. Supreme Court to determine if, under the Clean Air Act, CO₂ is a pollutant that endangers public health and welfare. This endangerment finding sets the stage for the agency to regulate emissions and could ignite one of the most extensive regulatory rule makings in history, with major implications for the way the federal government and the nation as a whole do business. The endangerment finding will significantly impact the power generation, transportation, and manufacturing sectors, for example, and will be a catalyst for both existing and new energy and climate-change legislation.⁴

As a result of the GHG endangerment finding, new legislation will likely require new federal and commercial projects to undergo the National Environmental Policy Act's review process to include CO₂ impacts. The mandatory review, in turn, will likely boost green building practices to an unprecedented level, since new construction projects will be subject to public review—including aspects related to GHG generation. The review will look at the GHG impacts not only of the construction itself, but also of the planned operations and maintenance activities once construction is complete.

Methodology

Greening methods aim both to clarify what is meant by a "high-performance green building" and to provide a rigorous framework for measuring parameters. The federal government has developed a legal definition, and the U.S. Green Building Council has established the most widely used system for measurement.

Defining green. In simple terms, a green building is a structure constructed after considering the impact on the environment and on human health and taking steps to reduce that impact, typically by using less energy and water (relative to a non-green building) and reducing GHG emissions throughout its life cycle. The Energy Independence and Security Act of 2007 provides a more formal definition. Relative to similar buildings (as measured using data from the Commercial Buildings Energy Consumption Survey⁵ and from the Residential Energy Consumption Survey by the Energy Information Agency⁶), a *high-performance green building* is one that, during its entire life cycle,

- reduces energy, water, and material resource use;
- improves indoor environmental quality, including reducing indoor pollution, improving thermal comfort, and improving lighting and acoustic environments that affect occupant health and productivity;
- reduces negative impacts on the environment, including air and water pollution and waste generation;

- increases the use of environmentally preferable products, including biobased, recycled content, and nontoxic products with lower life-cycle impacts;
- increases reuse and recycling opportunities;
- integrates systems in the building;
- reduces the environmental and energy impacts of transportation through building location and site design that support a full range of transportation choices for building users; and
- considers how the building affects human health and the environment, including improvements in worker productivity and the impacts of building materials and operations.

A measurement system. In 1998, the U.S. Green Building Council established the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, initially funded by the DOE. The LEED system has done much to encourage and accelerate the global adoption of sustainable green building and development practices by offering a universally understood and accepted set of tools and performance criteria. The system includes the four certification categories that are based on a points system: Certified, Silver, Gold, and Platinum. The more points a building is awarded, the more environmentally friendly the building is considered to be. A building that receives LEED Platinum—the highest level—is deemed to have state-of-the-art design and operating efficiency.

LEED rating systems exist for many building categories, but the two most relevant to the federal government are new construction and existing buildings. Each rating system, in turn, has categories, and for each of those categories, a building earns points (or credits) toward one of the certification levels for that rating system. Categories for the rating system *existing buildings operations and maintenance*, for example, include sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental, and innovation in design operations. Categories can also include prerequisites. Within the energy and atmosphere category, for example, are the prerequisites of energy efficiency best management practices, minimum energy efficiency performance, and refrigerant management and ozone protection.

In keeping with the LEED hallmarks of openness and transparency, the technical criteria that LEED committees propose are open to public review for approval. More than 10,000 membership organizations within the U.S. Green Building Council have the opportunity to review the criteria.

Council officials have reached out and been successful in supporting federal, state, and local governments in their pursuit and development of green building programs and initiatives. Various LEED efforts—including legislation, executive orders, resolu-

tions, ordinances, policies, and initiatives—can be found in 44 states and 12 federal agencies or departments.

To objectively measure the success of its sustainable design achievements, the GSA decided in 2000 that all capital projects from 2003 on would be assessed using the LEED rating system. And in 2006, it reported to Congress that it would use only LEED in assessing its own projects.⁶

At present, government-owned or occupied LEED buildings make up 26 percent of all LEED projects. The federal government has 138 certified projects and another 1,236 projects are pursuing certification. State and local governments have even more projects in various stages of certification.

The American Recovery and Reinvestment Act of 2009 provides tens of billions of dollars in funding initiatives for green building and retrofitting. It represents an unprecedented commitment.

Funding

The American Recovery and Reinvestment Act of 2009 (ARRA) provides significant new opportunities for federal property owners, developers, and other stakeholders in the green building arena. The Act provides tens of billions of dollars in funding initiatives for green building and retrofitting, representing an unprecedented commitment to green building. Although details are still being worked out, several allocations are noteworthy.

Federal building efficiency. ARRA allocates \$4.5 billion to the GSA to convert its facilities to high-performance green buildings (as defined by the Energy Independence and Security Act of 2007), thus making federal buildings more energy efficient. A key 2007 GSA memorandum to assistant regional administrators and public building service officers announced the GSA's adoption of the LEED certification system. In addition, the memorandum states that new construction or substantial renovation of a building or leased space over 10,000 rentable square feet must achieve at least LEED Silver certification.⁷

Department of Defense green renovation. ARRA allocates \$4.2 billion to facilities modernization, and a portion of that is set aside for Department of Defense facilities improvements related to green building.

Office of Federal High-Performance Green Buildings. ARRA allocates \$4 million to the Office of Federal High-Performance Green Buildings within the GSA—an office set forth in the Energy Independence and Security Act of 2007.

Green building training. ARRA allocates up to \$3 million to establish green building training with on-the-job pre-apprenticeship and apprenticeship training programs registered with the Department of Labor. The training is to equip personnel for the construction and repair of green federal buildings and alteration of non-green federal buildings to make them green.

The exact projects that will receive allocations pursuant to the ARRA have not been fully released. However, as of April 24, 2009, a search on www.fedbizopps.gov using the keyword LEED yielded 330 specific federal opportunities.

Capacity building

Notable among the federal agencies gearing up to tackle the greening of federal buildings are the GSA, DOE, and EPA.

General Services Administration. In March 2008, the GSA established the Office of Federal High-Performance Green Buildings to ensure the full coordination of high-performance green building information and activities within the government as mandated by the Energy Independence and Security Act of 2007. This newly created office works in conjunction with the DOE office that has a similar responsibility for commercial buildings. The duties of the new office are to

- establish a federal green building advisory committee;
- identify and develop technical standards for high-performance green buildings;
- establish green practices for facilities operations and maintenance;
- provide information and disseminate research results;
- identify practices and tools to achieve high-performance green buildings through budgeting and contracting;
- identify opportunities to demonstrate innovative technologies and concepts; and
- identify incentives to encourage the design and construction of high-performance green buildings and technologies.

Figure 1 shows an image of a GSA building in San Francisco.

Department of Energy. The DOE's Building Technologies Program aims to realize net-zero buildings—structures that generate as much energy as they consume by using efficient technologies and on-site power generation. "Toward Net-Zero Energy Installations" on p. 42 describes some of the solutions that military in-



Figure 1. General Services Administration green building in San Francisco. Raised furniture and private work areas that end below the concrete ceiling enable natural light and promote airflow for more efficient heating and cooling. (Image used with permission from Roland Halbe Fotografie; www.rolandhalbe.de.)

stallations, such as U.S. Marine Corps Air Station Miramar, are implementing as part of this program.

The program's goal is to improve the energy efficiency of commercial buildings in the United States while simultaneously improving the buildings' quality, occupant comfort, and cost-effectiveness. As Figure 2 shows, focus is on reducing the energy demand in buildings in a way that permits the successful integration of market-acceptable renewable energy technologies—both on-site and purchased.

To achieve this goal, the program requires a building to use energy-efficiency and renewable energy technologies, recycled and sustainable materials, and site-sensitive design—all of which minimize the building's burden on the environment. The program is run in partnership with the private sector, state and local governments, national laboratories, and universities.

The DOE Building Technologies Program has also launched a Net-Zero Commercial Building Initiative, which aims to achieve marketable net-zero energy commercial buildings by 2025. The Net-Zero Energy Commercial Building Initiative (or Commercial Building Initiative) encompasses all activities that support this aim including industry partnerships, research, and tool development.

Environmental Protection Agency. The EPA launched its own green building strategy in 2008 with the stated goal of enhancing coordination of its programs and driving to an overall goal of facilitating the mainstream adoption of effective green building practices. The environmental footprint and life-cycle of buildings, including siting and development, are addressed. With significant work already accomplished in technology areas by other agencies, the EPA's near-term impact will likely be in the implementation of rule making that facilitates high-performance green building practices.

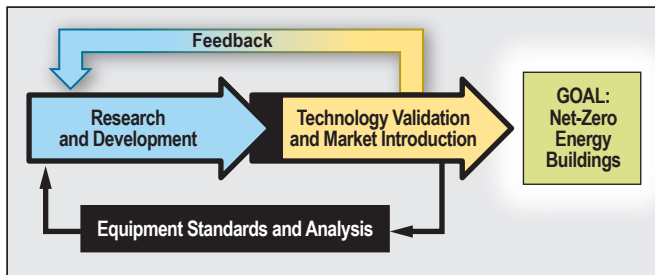


Figure 2. Vision of the Department of Energy's Building Technologies Program. The goal is to produce buildings that generate as much energy as they consume. To meet that goal, developers of green buildings begin with research and development, which then helps validate the technology and provides an informed way to introduce it. Once technology is in the field, information about its use informs the derivation of equipment standards and analysis. (Figure from http://www1.eere.energy.gov/buildings/program_areas.html.)

The opportunity to transform policy, influence behavior and effect a “step change” in the design, construction, and operation of buildings to address global warming, efficiency, and other green goals is upon us. Seldom in recent memory has there been as much political and policy momentum converging on a single agenda. Virginia Tech scholar Arthur Nelson has forecast that 89 million new or replacement homes and 190 billion square feet of new offices, institutions, stores, and other nonresidential buildings will be constructed through 2050. If Nelson's forecasts are correct, two thirds of development on the

ground in 2050 will have been or will be built between 2007 and then.⁸ As government, industry, and citizens scale these steps, the type of atmospheric climate—and school, home and work environments—must be kept in mind so that the next generation will benefit and have a strong foundation from which to make its own strides. ■

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Sigma—In Addition

More from Noblis authors:

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