**House Transportation and Infrastructure Committee**
**Subcommittee on Economic Development, Public Buildings, and Emergency Management**
**Hearing on Efficiency and Resiliency in Federal Building Design and Construction**
**Testimony of Dr. Mark Russell, PhD, PE, GGA, LEED AP, BREAAM IA**
**on behalf of The Green Building Initiative/Green Globes**
**June 11, 2019**

Thank you Chair Titus, Ranking Member Meadows, and members of the committee for this opportunity to share some information and thoughts on the Green Building Initiative (GBI), our certification system Green Globes, and our work supporting the federal government's efforts toward advancements in green building.

My name is Mark Russell and I am a professional engineer based in Gainesville, Florida, with a PhD in Building Construction. My PhD dissertation focused on enhancing building rating systems. I am also a credentialed Green Globes Assessor (GGA) who has completed 44 federal building projects under the Green Globes and Guiding Principles Compliance programs. I have 22 additional federal projects currently in progress. I am appearing here today on behalf of The Green Building Initiative (GBI).

This statement will discuss the Green Building Initiative: our green building certification systems Green Globes and Guiding Principles Compliance; GBI's role working with the federal government on green building and sustainability; and the trends we see in this space.

## The Green Building Initiative: Green Globes and Guiding Principles Compliance programs

First, I would like to provide some background on GBI for those on the Subcommittee who are not familiar with our role. GBI is a 501(c)(3) non-profit organization that brought the Green Globes certification system into the U.S. in 2004, having been adapted to the U.S. market from its original Canadian version. In 2005, GBI was approved as the first ANSI consensus-based Standards Developer for commercial green building certification systems in the U.S. GBI then undertook a multi-year process to bring together an ANSI Consensus Body and develop its American National Standard, ANSI/GBI 01-2010: Green Building Assessment Protocol for Commercial Buildings. Green Globes was further revised in 2013 to make several improvements, including adding many of the federal government's Guiding Principles requirements into the system, and transitioning the entire system into a comprehensive online software program that provides clients with a user-friendly system that promotes a team-based approach to achieving goals. GBI has received ANSI approval of the revision to its 2010 American National Standard, now titled, ANSI/GBI 01-2019: Green Globes Assessment Protocol for Commercial Buildings, and it will be published in mid-June, 2019. In fact, today in

Chicago, GBI is conducting its Board of Directors meeting to review ANSI's final approval of ANSI/GBI 01-2019: Green Globes Assessment Protocol for Commercial Buildings, and to vote to approve and officially publish the updated consensus standard. This represents the culmination of a four-year cycle in the ANSI consensus update process that consisted of 38 full Consensus Body meetings, a total of more than 230 open meetings including subcommittee meetings, and 3 open public comment periods. Going forward, the updated Standard will be maintained using ANSI's Continuous Maintenance process.

Green Globes offers four levels of certification. One Green Globes is the first level and requires at least 35% of Green Globes criteria to be met; whereas Four Green Globes is the highest level and requires 85% of criteria to be met. Green Globes uses a 1000-point system, where the point allocations are strategically weighted across the criteria to drive users towards best practices, rather than static prerequisites. The criteria cover a number of categories including energy, water, project management, site, water, materials & resources, emissions, and indoor environment.

Additionally, Green Globes' process requires third-party assessment by an experienced Green Globes Assessor (GGA or assessor).

Under GBI's requirements, GGAs must be a licensed engineer or architect, have an educational background in engineering, architecture, or sustainability, 10+ years of prior building experience, evidence of significant work on at least three sustainable projects, and must also complete GBI's Green Globes Assessor training program and pass a series of exams. Assessors are involved with each project from the earliest possible point. Although the first official review of the project often occurs at the completion of the construction documents, assessors can be called upon by the design team during the design phase to provide recommendations to improve the building performance. Once the building has been completed, the assessor travels to the building location and performs an onsite assessment prior to submitting the final report on eligibility for certification. During the site visit, the GGA meets with the project team, reviews final documentation, and tours the building in a typically 6-8 hour timeframe to verify implementation of claimed credits. The GBI performs a review of all reports to ensure consistency and appropriate credit validation prior to issuing the official building certification. Once the certification is completed, the client receives a detailed copy of their final assessment report, which identifies the criteria that were met to achieve their level of certification, and provides recommendations for additional actions that can be taken in the future to improve the building further.

Green Globes' combination of weighted criteria and direct oversight by third-party assessors makes across-the-board prerequisites unnecessary in our system and accommodates each building's unique features and sustainability goals. In addition, the Green Globes system includes a Not Applicable (N/A) feature that allows project teams to identify criteria that do not apply to their projects. The assessor verifies the validity of each N/A claim through a document review or site visit—meaning project teams cannot claim N/A for a criterion simply because they don't want to comply with it.

Weighted criteria, actively engaged expert GGAs, an onsite assessment, and the ability to identify N/As mean that Green Globes can be used to certify unique buildings in both the private and public sectors. For example, a recycling facility in the Rocky Mountains at an elevation of 10,000+ feet is not penalized for a lack of energy efficient air-conditioning systems because the climate requires no air-conditioning. Likewise, a Department of Defense building that—for mission purposes—has no windows is not penalized under Green Globes for omitting energy efficient windows from its design.

In 2012 GBI first introduced to the federal market our Guiding Principles Compliance (GPC) program, which was designed specifically to help federal departments and agencies to efficiently and confidently confirm their compliance with the requirements of federal guiding principles for sustainability. The 2013 update of Green Globes also included the incorporation of federal guiding principles requirements as established by the Interagency Sustainability Working Group (ISWG) as a subcommittee of the Steering Committee established by Executive Order (E.O.) 13423. The ISWG initiated development of the *High Performance and Sustainable Buildings Guidance (Guiding Principles)* to meet the EO goals. Additionally, in 2015, GBI worked closely with the Department of Defense to develop a program called Department of Defense Guiding Principles Compliance for New Construction & Modernization (DoD GPC NC,) which specifically combines the federal guiding principles requirements and those of the DoD's Unified Facilities Criteria (UFC 1-200-02) to provide the military branches with a program that allows them to verify compliance with the complex overlay of both federal and military-specific requirements. Not long after launch, the DoD GPC NC program was updated to reflect changes made in the 2016 Guiding Principles update.

Federal projects choose either to certify under Green Globes, Guiding Principles Compliance, or in some cases, dual-certify under both systems. The GPC programs are prescriptive in nature, covering the requirements of the Guiding Principles, whereas Green Globes is performance- based. Many federal teams choose to dual-certify their buildings under GPC *and* Green Globes because it provides guidance on additional opportunities for sustainable design in a building. As of May, 2019, 193 federal projects have certified under both programs.

## Federal Recognition and Federal Projects

In 2013, Green Globes was recognized by the GSA in its statutorily required High-Performance Building Certification System (HPBCS) Review as a certification program that could be used by the federal government to certify federal buildings alongside of USGBC's LEED program. The GSA recently released its initial analysis of the 2019 HPBCS Review, again recommending Green Globes as a system for use by the federal government.

GBI has long supported the idea that the federal government should encourage competition in the marketplace as it relates to federally approved certification systems. The federal government, as a significant customer in the marketplace, should be able to make choices among certification systems

to identify those that best meet the needs of the many unique projects that the government undertakes. Additionally, encouraging certification systems to compete for the government's business not only puts the government into a better position to ensure it is getting what it needs for its projects, and attaining a good cost-benefit for taxpayers on the building certifications, it also encourages certification systems to continue to evolve and compete in order to meet government needs.

Since federal recognition of Green Globes was confirmed by the Department of Energy in 2014 and Guiding Principles Compliance was introduced in 2012, over 600 federal projects have been undertaken by nine federal departments and agencies including those such as DHHS, DHS, DOD, DOE, State Department, GSA, NASA, Department of Veterans Affairs, and USDA. Today, GBI has 104 additional federal building projects in process, for a total of over 750 federal building reviews completed or in progress since 2014.

The scope of federal buildings certified through Green Globes and GPC is broad. We have worked with projects ranging from offices and courthouses to data centers, laboratories, VA hospitals, specialized military facilities such as military working dog facilities in Guantanamo Bay, Engine Test facilities, Utility Distribution Centers, Submarine support centers, Barracks, Operational Readiness facilities, Training buildings, and Parachute maintenance facilities. Many federal project teams have appreciated GBI's approach to certification—noting that the ability to move their unique buildings and facilities through the GBI process using a team-based and user-friendly online system—and assessors who are actively involved and available to the teams throughout the project—has helped the departments and agencies to achieve their goals.

Some of the more interesting projects I have encountered in my time as a GGA include the renovation of a USDA Forest Service facility in Northern Wisconsin that was designed to reduce impact on the environment and educate the visitors on the sustainable principles; a VA facility in Oregon that uses an ice generation plant to create an ice reservoir that is then used during the day to cool the facilities; and a Navy Exchange car care center that is designed to capture exhausts and recycle vehicle waste products.

## Trends in Federal Sustainability Efforts

Throughout our work with the federal government and GSA in the area of sustainability, we have noticed several significant trends. As a Green Globes Assessor, I see directly that repeat clients often demonstrate significant improvements in subsequent buildings with energy savings, water conservation, and material selection. The use of the certification program helps to organize and guide federal teams while educating them about the vast possibilities for improving their buildings. Once they have gone through the process, it informs their teams in the next project and often leads to an even greater desire to pursue more sustainability, efficiency, and long-term cost savings.

Additionally, I find that in going through the certification process with federal teams that they are increasingly focused on ensuring that information is shared among other facilities in a campus environment and a synergy of techniques such as improved air handling systems and base wide monitoring systems are being installed. The involvement of a base energy manager or a sustainability coordinator enhances the program and further encourages higher levels of building ratings. Much of the data that is accumulated during the evaluation process can be used for tracking building performance and improving the life cycle efficiency of the facility. By effectively capturing the applicable information in the bases monitoring program they can continue to ensure that the building will perform at the optimum level and facilitate future maintenance operations.

Importantly, the use of GSA tools such as SFTOOL.GOV has assisted project managers in selecting appropriate materials and tracking procurement activities. DOE tools such as PVWATTS.NREL.GOV are providing a quick reference to assist with the decision making process. The federal government has invested in creating important tools that help the federal teams make good decisions about building construction and renovations. As an assessor, I often help to educate the project team on the available resources to improve the efficiency of the building and document their decisions.

More broadly, we see that government teams including GSA are increasingly interested in the health and wellness factors that are influenced by the buildings owned and used by the federal government. These factors, while in many cases are still being defined, are increasingly important to federal teams for the impact they have not only on the health and safety of federal workers, but also on creating workplaces that lend themselves to increased productivity of the federal workforce and increased longevity of the workers' tenure with the departments and agencies. This increasing interest in the nexus between buildings and their impact on the health and wellness of the workers within them has encouraged the evolution of certification systems in the private sector to do more to assess these areas. While Green Globes has always assessed key indoor environment factors such as ventilation systems, views, daylighting, air quality, thermal comfort, and noise attenuation, Green Globes' new ANSI update now includes criteria such as passive strategies for natural light, access to outdoors, and a Health Risk-Assessment, which assesses items that could impact the general health and welfare of humans (including residents, workers, and visitors). There is also a section on the Environmental Management System which reviews policies and practices that support the health of humans, especially those in occupied buildings during the construction process, which is often the case in federal projects.

Additionally, among federal teams we have seen an increased focus on attempting to identify the cost-effectiveness and taxpayer benefits of improving the performance of federal buildings. The recent implementing instructions that accompanied *Executive Order 13834, Efficient Federal Operations,* specifically emphasize these concepts as well. Another of GBI's third-party assessors, Jane Rohde of JSR Associates, Inc., who is also a member of GSA's Green Building Advisory Committee, conducted an analysis in 2017 of federal projects certified under Green Globes entitled "Efficiency, Effectiveness and Accountability for Federal High Performance Buildings: Green Globes

Certification and Guiding Principles Compliance Assessment Program Cost-Benefits." In the analysis, she noted that a federal high efficiency building's energy and water savings, relative to an average sample of similar federal buildings, demonstrated a return on investment (ROI) of more than 200 percent over the life of the building. In her study of the topic she interviewed many federal agency energy managers with one noting, "[Since the Green Globes certification] back in 2009, we've probably increased our services by 40 percent, and our energy use has stayed flat. We probably have added 1,000 employees in that time."

According to the National Institutes of Buildings Science's *Whole Building Design Guide (WBDG)* [https://www.wbdg.org/resources/life-cycle-cost-analysis-lcca], the average life cycle costs of a building over a 30 year period are 2% for design and construction, 6% for operations & maintenance (O&M), and 92% for personnel. If we assume, for purposes of example, an extremely modest construction cost of $10 million, this would mean that the operations & maintenance costs of that building would be $30 million over its lifetime, or roughly $1 million per year. The WBDG also notes that approximately 50% of the O&M costs annually are in energy, meaning that our imaginary building spends approximately $500,000 per year on energy costs.

Federal buildings typically design their sustainability projects to achieve around 30% energy savings—in fact, the federal Guiding Principles direct projects to achieve a minimum of 30% energy savings. For purposes of the example, we will assume that the total cost of all sustainability measures (planning, equipment, materials, technology, etc.) cost about 10% of the building cost, or $1 million. Due to the energy savings built into the sustainability upgrades, the building has decreased its energy use by 30%, meaning it is saving $150,000 per year in energy versus its previous energy costs. The $1 million cost of implementing the sustainable features saves $150,000 per year, and therefore the costs are recouped in 6.7 years. After that point, the initial investment is paid off and the building's energy cost savings are fully benefitting the bottom line. This very basic explanation doesn't take into account the indoor environmental factors that improve the health, well-being, and retention of employees, which is of course more difficult to quantify. But even without considering all of the other benefits that come from sustainability, the imaginary building is saving approximately $3.45 million alone in energy costs during its 30-year lifetime. These types of savings, multiplied across the vast federal portfolio, are a significant benefit of sustainable design and improvements.

In our opinion, the focus of federal project teams on enhancing the performance and sustainability of the federal building stock provides benefits to taxpayers by improving energy efficiency, lowering water usage, and utilizing advanced technologies and construction practices to lower costs associated with the federal government's building stock. We believe that the efforts of the federal government to continue to pursue efficiency and sustainability should continue to be encouraged.

Another trend we see in both the federal and private sector sustainability fields is a push toward incorporating and better understanding the concept of "resilience." The next step to enhancing the concept of sustainability, the focus on determining the resilience of buildings—how well buildings can

withstand an emergency situation and recover from it. GBI's ANSI update has added new criteria related to resilience, including a Building Risk Assessment. The assessment is designed to analyze continued building occupancy resulting from extreme natural events, anticipated changes to regional and local environment, and human activity for the expected service life of the building. The assessment identifies hazards and evaluates the probability and expected severity of occurrence of those events. These hazards include, but are not limited to, weather, flooding, seismic and volcanic events, drought, wildfire, soil stability, and terrorism.

However, in conversations with both federal agencies and private sector groups, we find that there is some disagreement about what constitutes true resilience, how to properly define its scope, and how to determine which buildings need to be resilient in the face of potential future disasters. In the private sector there is seemingly still a challenge related to finding entities that are qualified to determine that a building can be certified as "resilient." Because again, the question often becomes "resilient to what and for how long?" For example, many entities and experts who might attempt such resilience certifications are finding that their general liability insurance companies are unwilling to insure those declarations made by experts, fearing liability later if buildings are irrevocably damaged after having been certified as "resilient" by an expert they insure. This type of private sector uncertainty creates some challenges for developing a comprehensive and uniform definition of resilience, and a plan to achieve it. However, we believe that the ongoing work of the federal government in this area will be important to informing the private sector about the role of emerging resilience technologies, practices, and concepts. In every US community, the federal government operates facilities and offices that are important to the community and often key to helping a community respond to and address the aftermath of an emergency. Improving the sustainability and resilience of the federal portfolio will have long-term benefits once we can answer the question, from which types of potential challenges do specific federal buildings need to be resilient?

Importantly, while most people—when they think about the performance of federal buildings—think about buildings that are owned by the federal government, one of the areas of biggest challenge that we see is that of the leased portfolio of the federal footprint. Today, more than 50% of the GSA's footprint is in leased, or built-to-lease, buildings and facilities. The federal government as a whole is the largest commercial tenant in the United States, occupying approximately 2.8 billion square feet of leased space, and its influence is great. While big cities like DC, New York, Chicago, and San Francisco, and states like Nevada, have prioritized policies that promote sustainability and enhanced building performance, many small- and medium-sized areas of the country and many private sector owners have not—whether due to a lack of information, a lack of incentive, or a lack of funds to undertake such improvements. Yet in many ways the government does not get to choose where to locate its offices and buildings—the federal government must be available everywhere. The lack of sustainably-designed buildings offering space for lease impacts the ability of GSA to find and secure space that helps the government meet its sustainability and energy savings goals.

There are some market changes occurring in a few areas where we see private sector building owners and developers incorporating sustainability and energy saving measures in an effort to entice the federal government to lease space in their buildings. However, market adoption in small and medium cities is slow to evolve and presents an interesting opportunity for the federal government, as a customer in the marketplace, and entities like GBI to find ways to encourage the adoption of sustainability measures. As a 501(c)(3), GBI's mission includes attempting to broaden the base of buildings in the U.S. that pursues sustainability and to explain to building owners and developers the benefits that result from both the better performance of a building and the lessening of its impact on the local community.

## Conclusion

The federal government's leadership and influence in the area of green building and sustainability continues to be significant. The continued prioritization of improving the performance of federal buildings stands to ultimately benefit not only government workers and their productivity, but also taxpayers who will benefit from the cost savings generated by a more nimble, energy-efficient, and sustainable federal portfolio. The Green Building Initiative has greatly enjoyed its ongoing collaboration with the federal government on hundreds of projects, and we look forward to assisting the federal project teams as they strive to build and redevelop federal buildings and spaces to address better performance, sustainability, resilience, and savings for American taxpayers.

Thank you for this opportunity to provide our thoughts.