Computational and Geospatial Sciences Building

Gulf Breeze, Florida

The Gulf Ecology Division Laboratory, located in Gulf Breeze, Florida, is a primary research facility of the U.S. Environmental Protection Agency's (EPA's) National Health and Environmental Effects Research Laboratory (NHEERL) within the Office of Research and Development. In the Computational and Geospatial Sciences (CGS) building, EPA conducts research on the impact of human activities on marine, estuarine, and wetland ecosystems and develops strategies to degrade toxic chemicals in the environment through biogeochemical population and community modeling.

Out of Destruction, Opportunity

When Hurricane Ivan tore through Florida's Gulf Coast in September 2004, it served as a powerful reminder to EPA's Gulf Ecology Division Laboratory facilities: intelligent facility design in the 21st century requires the highest standards for safety and durability, as well as sustainability. Located on Sabine Island, a 16-acre patch of land off the coast of the Florida Panhandle, the laboratory campus was especially vulnerable to the hurricane's devastating winds and rain. In the wake of the storm, six of the 40 buildings at the campus were destroyed and had to be temporarily replaced with modular structures.

Vital Statistics

Facility Type: Computational Research Center

Construction: Owned/New Construction

Location: Gulf Breeze, Florida

Size: 7,707 gross square feet

Occupancy: 30

Opened: January 2008

LEED® Status: Silver 2.2 Certification for New Construction

What began as a plan for a permanent replacement for these buildings culminated in 2008 with the completion of the CGS building. Designed to meet the Florida Building Code, which requires stringent hurricane mitigation techniques, and having earned the U.S. Green Building Council's (USGBC's) Leadership in Energy and Environmental Design (LEED®) Silver 2.2 certification for New Construction (NC), this building meets the demands of its environment in a sustainable manner.

Designed to Weather the Gulf Coast

Sustainable technologies incorporated in the CGS building's design simultaneously minimize its environmental impacts and help shield the building from potentially damaging aspects of the coastal environment. For example, the design of the roof involved careful consideration of multiple environmental factors. The building designers chose a light-colored aluminum as the primary roofing material because traditional shingles tend to come loose in tropical storms and hurricanes. As an added benefit, the light-colored aluminum helps keep cooling costs down by reflecting sunlight rather than absorbing it.

Local building codes require that windows either be equipped with storm shutters or made of high-impact glass. Considering the time, maintenance, and potential risk involved with putting up and taking down storm shutters for each threatening storm, EPA opted for high-impact windows and skylights. These features provide safety and durability, as well as ample daylighting to reduce energy needs for lighting.

In addition to extreme seasonal weather, the CGS building is also exposed to frequent rain, high humidity, and corrosive ocean spray. For this reason, EPA selected a sturdy wood pulp, sand, and cement composite made of recycled material for the building's siding. In keeping with the goal of energy efficiency, and consistent with the motif of the surrounding buildings, the siding is a reflective, UV-resistant, white color.

High-impact glass windows provide safety and durability.

Long before the development of modern air conditioners, expansive porches were designed to provide buildings with shade from the heat of the American South. The architects at Bullock Tice and Associates integrated this traditional feature of southern plantation-style architecture by designing a large porch to line the front of the CGS building. This old-fashioned, yet effective, sustainable design feature keeps building temperatures down, while providing an aesthetic continuity with the other buildings on the laboratory campus.

The light-colored roof reflects heat while front windows provide ample daylighting.

Energy Savings in the Sunshine State

Because research conducted at the CGS building requires energy-intensive computer systems, the building's design maximizes energy efficiency by focusing on other areas of energy use, including lighting, heating, and cooling. The design capitalizes on Florida's ample sunshine and warm climate. In addition to extensive daylighting, the CGS building is also equipped with occupancy sensors to ensure that lighting is only used when necessary. The main HVAC system features a high-efficiency, air-cooled water chiller. The system has a 50 percent unloading capability, which allows the facility to reduce energy use and costs during Florida's milder months. Through these strategies, the building is designed to achieve a 17.6 percent savings in energy costs as compared to a conventionally designed building (as defined by ASHRAE 90.1-2004). As of March 2009, the CGS building's annualized energy intensity is approximately 66,000 British thermal units per gross square foot (Btu/GSF), which is 72 percent lower than the cumulative annualized energy intensity of the non LEED-certified buildings comprising the Gulf Ecology Division Laboratory.

As with the rest of the Gulf Breeze campus, 100 percent of the electricity the CGS building uses is offset as part of an Agency-wide blanket contract for a combined total of 69 million kilowatt hours (kWh) of renewable energy certificates (RECs). This amount is enough electricity to cover all of the Gulf Breeze laboratories' needs, as well as those of many other EPA facilities across the country, through March 2010. The RECs EPA purchases support renewable energy generation from wind and biomass resources.

Saving Water Is a Breeze

In a state with recurring drought concerns, conserving potable water is especially vital to the Gulf Ecology Division Laboratory. In addition to the environmental benefits, using as little water as possible also translates to cost savings. For these reasons, the CGS building was designed with a host of water conservation features.

To further increase cost savings and conserve water, the building's urinals and toilets use 100 percent recycled water gathered from a rainwater cistern on the roof. The CGS building achieved an impressive 44.5 percent potable water use reduction from the baseline design through these water-saving technologies. Additionally, EPA installed landscaping that does not require a permanent irrigation system around the building to further minimize the use of potable water.

Some of the ecological and biogeochemical research conducted at the Gulf Ecology Division Laboratory requires observing the aquatic environment surrounding Sabine Island. To protect the water quality beyond its shores and to reduce the risk of flooding during storms, a 3,600-square-foot grassed swale was constructed to convey stormwater from impervious surfaces to those that can detain or absorb runoff. The cistern on the roof of the facility also helps manage stormwater runoff.

Sustainable Construction Materials

With resource efficiency in mind, the building's designers made a concerted effort to use recycled-content and locally manufactured materials for the new building. As a result, 51 percent of materials were manufactured within a 500-mile radius of Sabine Island, and 21 percent of materials feature recycled content, including the cabinets installed in the break room. All wood-based materials for the project were certified as having been harvested from responsibly managed sustainable forests by the Forest Stewardship Council. Additionally, 73 percent of construction period waste was recycled, diverting 702 cubic yards of material from landfills. All of these measures ensured that the construction process employed sustainable practices to the extent feasible.

The break room cabinets were built from recycled-content materials.

A storage tank collects rainwater from the cistern.

Gulf Breeze and Beyond

With a host of design features and strategies to minimize environmental impacts and protect the building from weather extremes, EPA's new CGS building demonstrates how sustainable design practices promote harmony between a building and its surrounding environment, even on an island in hurricane country. This facility also illustrates how high-tech green building design can be successfully implemented without sacrificing historical architectural style and integrity. With the completion of the CGS building in Gulf Breeze, the Agency has yet another testament to its commitment to high-performance and sustainable buildings.

The building's siding is a wood pulp, sand, and cement composite made of recycled material.

Final LEED® Scorecard for the Computational and Geospatial Sciences Building, Gulf Breeze, Florida

Certification Achieved: LEED-NC 2.2 Silver

The LEED Scorecard provides an itemized account of the specific green building criteria met through the design and construction of the CGS building. Based on these criteria, the facility earned 33 of 69 possible points and achieved a LEED for New Construction Version 2.2 Silver certification.

33	Points Documented	Points Available:	69

8	Sustainable Sites	Possible Points:	14
Yes	Prerequisite 1	Construction Activity Pollution Prevention	
1	Credit 1	Site Selection	1
	Credit 2	Development Density & Community Connectivity	1
	Credit 3	Brownfield Redevelopment	1
	Credit 4.1	Alternative Transportation: Public Transportation Access	1
1	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
1	Credit 4.3	Alternative Transportation: Low-Emitting & Fuel Efficient Vehicles	1
1	Credit 4.4	Alternative Transportation: Parking Capacity	1
1	Credit 5.1	Site Development: Protect or Restore Habitat	1
1	Credit 5.2	Site Development: Maximize Open Space	1
	Credit 6.1	Stormwater Management: Quantity Control	1
	Credit 6.2	Stormwater Management: Quality Control	1
	Credit 7.1	Heat Island Effect: Non-Roof	1
1	Credit 7.2	Heat Island Effect: Roof	1
1	Credit 8	Light Pollution Reduction	1

4	Water Efficiency	Possible Points:	5
2	Credit 1.1-1.2	Water Efficient Landscaping	2
	Credit 2	Innovative Wastewater Technologies	1
2	Credit 3.1-3.2	Water Use Reduction	2

5	Energy & Atmosphere	Possible Points:	17
Yes	Prerequisite 1	Fundamental Commissioning of the Building Energy Systems	
Yes	Prerequisite 2	Minimum Energy Performance	
Yes	Prerequisite 3	Fundamental Refrigerant Management	
3	Credit 1	Optimize Energy Performance	10
	Credit 2	On-Site Renewable Energy	3
	Credit 3	Enhanced Commissioning	1
	Credit 4	Enhanced Refrigerant Management	1
1	Credit 5	Measurement & Verification	1
1	Credit 6	Green Power	1

6	Materials & Resources	Possible Points:	13
Yes	Prerequisite 1	Storage & Collection of Recyclables	
	Credit 1.1-1.2	Building Reuse	2
	Credit 1.3	Building Reuse, Non-Structural	1
1	Credit 2.1-2.2	Construction Waste Management	2
	Credit 3.1-3.2	Resource Reuse	2
2	Credit 4.1-4.2	Recycled Content	2
2	Credit 5.1-5.2	Regional Materials	2
	Credit 6	Rapidly Renewable Materials	1
1	Credit 7	Certified Wood	1

8	Indoor Environmental Quality	Possible Points:	15
Yes	Prerequisite 1	Minimum IAQ Performance	
Yes	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	
1	Credit 1	Outdoor Air Delivery Monitoring	1
	Credit 2	Increased Ventilation	1
1	Credit 3.1	Construction IAQ Management Plan: During Construction	1
1	Credit 3.2	Construction IAQ Management Plan: Before Occupancy	1
1	Credit 4.1	Low-Emitting Materials: Adhesives & Sealants	1
1	Credit 4.2	Low-Emitting Materials: Paints & Coatings	1
1	Credit 4.3	Low-Emitting Materials: Carpet Systems	1
1	Credit 4.4	Low-Emitting Materials: Composite Wood & Agrifiber	1
	Credit 5	Indoor Chemical & Pollutant Source Control	1
	Credit 6.1	Controllability of Systems: Lighting	1
	Credit 6.2	Controllability of Systems: Thermal Comfort	1
	Credit 7.1	Thermal Comfort: Design	1
	Credit 7.2	Thermal Comfort: Verification	1
	Credit 8.1	Daylighting & Views: Daylight 75% of Spaces	1
1	Credit 8.2	Daylighting & Views: Views for 90% of Spaces	1

2	Innovation & Design Process	Possible Points:	5
	Credit 1.1	Innovation in Design	1
	Credit 1.2	Innovation in Design	1
	Credit 1.3	Innovation in Design	1
1	Credit 1.4	Innovation in Design	1
1	Credit 2	LEED Accredited Professional	1

CREDIT SUMMARY

33	Points Earned	Points Attempted:	40

For more information on the USGBC's LEED® Green Building Program, visit <www.usgbc.org/LEED>.

For more information on the Computational and Geospatial Sciences Building project, visit <www.epa.gov/greeningepa/facilities/gulfbreeze.htm> or <www.epa.gov/ged/welcome.htm>.

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue, NW (3204R)

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