

**AIA Committee on the Environment (COTE)
MEASURES OF SUSTAINABLE DESIGN AND PERFORMANCE METRICS**

This set of 10 measures and supporting metrics is the foundation of the COTE Top Ten Green Projects, an annual awards program in its tenth year, and the basis of the COTE theory of sustainable design. COTE recognizes that great design includes environmental, technical, and aesthetic excellence. Stewardship, performance, and inspiration are essential and inseparable. Top Ten entrants are asked to provide narratives (maximum 200 words each) responding to specific categories and indicate an understanding of the connections between them, quantifying features when possible using the suggested metrics.

While emphasis should be placed on measurable results whenever possible, the narrative format recognizes that qualitative goals are often subjective and therefore cannot always be evaluated quantitatively. The brief essays allow the entrants to describe in their own words how the project's goals were pursued and achieved. Narrative and metrics should refer only to the final built project without regard to design measures that were not implemented. Selection favors beautifully designed solutions that exhibit an integration of natural systems and appropriate technology, verified through building systems modeling, analysis, and best practices. (Entrants also provide a description, key environmental features, project economics, and details about the process and results.)

Top Ten Measure 1: Sustainable Design Intent & Innovation

Narrative: Sustainable design embraces the ecological, economic, and social circumstances of a project. How did these circumstances drive the project's design? Did they influence the architectural expression? Describe the most important sustainable design ideas for your project as well as the specific circumstances or constraints that generated those ideas. (This should not be a list of sustainable design measures.) Describe any unique sustainable design innovations. How does the architectural expression demonstrate the sustainable design intent? How did the sustainable design effort lead to a better overall project design?

Top Ten Measure 2: Regional/Community Design & Connectivity

Narrative: Sustainable design recognizes the unique cultural and natural character of a given region. Describe how the design promotes regional and community identity and an appropriate sense of place. Describe how the project contributes to public space and community interaction.

Does the project's selected location reduce automobile travel from home, work, shopping, or other frequent destinations? Does the project make use of any alternative local or regional transportation strategies as well as successful efforts to reduce locally mandated parking requirements?

Metrics: Indicate percentage of the building population traveling to the site by public transit (bus, subway, light-rail or train), carpool, bicycle or on foot. Please indicate in the narrative whether there are company transportation policies and

incentives, and efforts made to provide a quality experience for those using transportation alternatives (enhancements to bikeway or pedestrian streets, etc.)

AND: Divide the total number of parking spaces available by the total building population (occupants and visitors). Parking spaces that are dedicated to the building use but not part of the building project must be counted. Please indicate in narrative if project is successful in providing fewer parking spaces than zoning requirements through proactive measures.

Percent of building population using transit options other than the single occupancy vehicle: _____ %

Number of parking spaces per person: _____

Top Ten Measure 3: Land Use & Site Ecology

Narrative: Sustainable design reveals how ecosystems can thrive in the presence of human development. Describe how the development of the project's site responds to its ecological context. How does the site selection and design relate to ecosystems at different scales, from local to regional? How does the development of the immediate site and its buildings relate to a larger master plan and/or land use guidelines for the area?

Describe the landscape design and the creation, re-creation or preservation of open space, permeable groundscape, and/or on-site ecosystems. Briefly describe any strategies for habitat creation and regionally appropriate planting. (Water will be addressed elsewhere.)

Describe any density or land use assessments and objectives. Is the site rural, suburban or urban, brownfield or other previously developed land, infill or greenfield? (Or can its land use be best characterized in other terms?) How does the project address sustainable land use practices within its given context?

Top Ten Measure 4: Bioclimatic Design

Narrative: Sustainable design conserves natural resources and maximizes human comfort through an intimate connection with the natural flows and cycles of the surrounding bioclimatic region. Describe how the building responds to these conditions through passive design strategies. What are the most important issues to address for your climate and building type? Describe your site analysis and how the building footprint, section, orientation, and massing respond to this analysis and to regional and local climate conditions, the sun path, prevailing breezes, and seasonal and daily cycles. Discuss design strategies and energy conserving techniques that reduce or eliminate the need for active systems or mechanical solutions. Describe how passive ventilation and solar design strategies shaped the building.

Top Ten Measure 5: Light & Air

Narrative: Sustainable design creates and maintains a comfortable interior environment while providing abundant daylight and fresh air. Outline design strategies that create a healthful and productive indoor environment through daylighting, lighting design, ventilation, indoor air quality, view corridors, and personal control systems. Describe how the project's design enhances connections between indoors and outdoors. Provide drawings or diagrams to illustrate these strategies.

Metrics: Identify the percentage of the total building area that uses daylight as the dominant light source during daylight hours (with electric lights off or dimmed below 20%). This calculation should include all areas of the building, including stairways, restrooms, corridors, etc. Identify the percentage of the total building area that can be adequately served by natural ventilation (with all HVAC systems shutdown) for all or part of the year.

Percent of total building area that is daylit: _____

Percent of building that can be ventilated or cooled with operable windows: _____

Top Ten Measure 6: Water Cycle

Narrative: Water is an essential resource for all life on earth. Describe how building and site design strategies conserve water supplies, manage site water and drainage, and capitalize on renewable sources (such as precipitation) on the immediate site. Outline water-conserving landscape and building design strategies, as well as any water-conserving fixtures, appliances, and HVAC equipment. List water reuse strategies for rainwater, graywater, and/or wastewater.

Metrics: What percentage of precipitation from a typical (regularly occurring in spring/summer/fall) storm event falling on the site is retained and infiltrated/recharged on-site? Naturally occurring storm water flows due to topography and soils inherent to the pre-development conditions on the site (unaffected by development) can be deducted from this calculation.

AND: This calculation must include all water use inside and outside of the building (e.g., plumbing fixtures, appliances, HVAC equipment, landscape irrigation, etc.). Potable water is defined as water that is extracted from municipal supply, wells or irrigation ditches. Reclaimed graywater and harvested rainwater should not be deducted for this calculation, but note the percentage of reclaimed water used and note the source in the narrative. Please describe water conserving strategies used and projected water savings in the narrative.

AND: If wastewater is re-used on site, rather than discharged to municipal treatment systems or conventional septic systems, identify the portion of wastewater that is reused on site.

Precipitation managed on site: _____ %

Total water used indoors: _____ gal/yr

Total water used outdoors: _____ gal/yr

Percent of total water from reclaimed sources. ____%

Percent wastewater reused on-site: _____ %

Top Ten Measure 7: Energy Flows & Energy Future

Narrative: Good design of building mechanical and electrical systems and integration of those systems with passive design strategies is essential for conserving natural resources and improving building performance. Describe how the design of building systems contributes to energy conservation, reduces pollution, and improves building performance and comfort. Describe techniques for integrating these systems with other aspects of building design. Describe effective use of controls and technologies, efficient lighting strategies, and any on-site renewable energy systems.

Sustainable design carefully considers the long-term impact of current decisions in order to protect quality of life in the future. Describe how your project responds to the on-going reduction and possible loss of fossil fuels. Does the project employ or encourage alternative energy sources? Describe strategies to reduce peak electrical demand through design, programming, use patterns, equipment selection, HVAC / lighting controls, and on-site energy generation. Describe how the building or parts of the building could function in a blackout (operable windows and daylight / independent power for life-safety etc.).

Metrics: Use the Environmental Protection Agency's (EPA) Energy Star Target Finder tool and enter your score here. (Note that a limited number of building types are available for this analysis.) Use actual utility meter or billing data whenever possible. Go to:

http://www.energystar.gov/index.cfm?c=new_bldg_design.bus_target_finder

EPA Performance Rating _____

For residential projects, if you used the HERS rating system, enter your score here. Go to:

http://www.energystar.gov/index.cfm?c=new_homes.hm_verification

HERS Performance Rating _____

Determine percentage of annual energy cost savings achieved with the design, as compared to a minimally code compliant base model. Use ASHRAE 90.1-2004, or the local code/standard, whichever is more stringent. Other, more stringent codes may be used as a baseline. However, the alternate code must be identified (including year of issue), and the calculation method (e.g., DOE-2 energy modeling, utility meter data, etc.) must be described. Also provide a PDF of the energy calculations (energy model summary, LEED energy sheet, Title 24 analysis, or other.)

Percent total energy savings: _____

Provide the requested detailed information to the extent possible. Note that total energy (consumption) includes all purchased and site generated energy, and refers to all related loads including HVAC, lighting, and plug loads. Square footage (sf) refers to gross square footage. Provide building "standard design" or "base case" from building energy model.

	Base Case	Actual	
Total annual energy:	_____	_____	Btu/sf/yr

Total annual energy by fuel:

Electricity	_____	_____	Btu/sf/yr
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Natural Gas	_____	_____	Btu/sf/yr
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Other (Specify)	_____	_____	Btu/sf/yr
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Heating:	_____	_____	Btu/sf/yr
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Cooling (If Necessary):	_____	_____	Btu/sf/yr
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Cooling capacity:	_____	_____	sf/ton
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Lighting Load Connected:	_____	_____	W/sf
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Lighting Load after Controls (estimate used in energy model):	_____	_____	W/sf
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Plug Load (estimate used in energy model):	_____	_____	W/sf
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AND: Identify peak electrical demand per net square footage of building area (subtract mechanical space and loading docks), and identify the extent to which you have reduced peak power demands through demand side management and renewable energy generation.

AND: What percentage of total annual energy usage for the facility is provided by on-site renewable energy sources? Identify the mix from the following list: PV, solar thermal, wind, micro-hydro, biomass (define) electricity, biomass thermal, geothermal, biogas (define), electricity, passive solar, others.

AND: What portion of the total annual energy usage for the facility is generated from grid supplied renewable sources that meet the Center for Resource Solutions (CRS) Green-E requirements? Please identify the sources used and the proportion from each source in the supplemental narrative.

	Base Case	Design Case	
Identify watt per net sf peak electricity demand	_____	_____	W/sf

Percent on-site renewable energy generation _____

Percent grid-supplied renewable energy _____

Supplemental Narrative: Describe the standard or guideline used to develop the base case and actual or design case for the data provided above, and identify the software used to perform any simulations.

Top Ten Measure 8: Materials & Construction

Narrative: The careful selection of materials and products can conserve resources, reduce impacts of harvesting, production, and transportation, improve building performance, and enhance occupant health and comfort. Describe the most important selection criteria, considerations, and constraints (such as optimizing health, durability, maintenance, and energy use, and/or reducing the impacts of extraction, manufacturing, and transportation) for materials or building assemblies for your project. What were the most important considerations in developing the building envelope? What were the most important material or building assembly decisions or selections (no more than 3) and how did they meet the criteria? Include consideration given to impacts on the environment over the full life cycle and the results of life cycle assessment if available. Describe any materials that are part of a "green lease" program. Describe construction waste reduction and any strategies to promote recycling during occupancy.

Top Ten Measure 9: Long Life, Loose Fit

Narrative: Sustainable design seeks to maximize ecological, social, and economic value over time. Describe how the project's design creates enduring value through long-term flexibility and adaptability. Why is this project likely to continue thriving far into the future? Identify the anticipated service life of the project, and describe any components designed for disassembly. Describe materials, systems, and design solutions developed to enhance versatility, durability, and adaptive reuse potential. Describe efforts to "right size" the project and to reduce unnecessary square footage.

Top Ten Measure 10: Collective Wisdom & Feedback Loops

Narrative: Sustainable design recognizes that the most intelligent design strategies evolve over time through shared knowledge within a large community. Clearly and specifically describe how your design process enhanced the ultimate performance and success of the building. How did collaborative efforts between the design team, consultants, client, and community contribute to success?

What lessons were learned during the design, construction, and occupation of the building? If starting over today, how would your approach or emphasis change? Identify efforts to document and share these lessons with the larger community. Describe commissioning and any on-going monitoring of building performance and occupant satisfaction. How do (or will) these contribute to building performance, occupant satisfaction, or design of future projects?

Other Information

Project Economics

Finance: Describe innovative cost analyses, financing strategies and/or partnerships that contributed to the success of the project. (<200 words)

Cost and Payback Analysis: Describe atypical project cost issues and provide estimated payback of any investment in green measures. (<200 words)

Process and Results

Provide as much detail as you can on any notable aspects of the process of designing and building this project, especially as they relate to its environmental performance. Information is required for only the first two phases; the rest are optional (PreDesign, Design, Construction process, Operations/maintenance, Commissioning, Measurement & verification/post-occupancy evaluation)

Rating System(s) Results: If the project has been officially rated under LEED®, BREEAM, or a local/regional green building program, please list Rating system, rating date (MM-DD-YYYY), and score or rating level.

GRAPHICS & IMAGES

Please provide at least 8 (and at most 10) digital images to describe the project. Include the appropriate credit and a description for each. Emphasis should be placed on graphics that best inform the jurors about the innovative sustainable design solution that has been developed. Warning: Entries with firm names appearing in the photo credit will be disqualified.

Minimum Informational Requirements: Context Plan showing the place, region, neighborhood (with North arrow); Site Plan (with North arrow); Floor Plans (with North arrow); Elevations; Sections and Details (including at least one section that illustrates daylighting, natural ventilation, or other sustainable design strategies); Photographs of completed project (interior and exterior).

PROJECT TEAM

At least one person must be identified as the "Primary Information Contact," and a phone number and email address must be provided for that person. For all project team members, identify role on the team, and list name, company name, city and state. Additional contact information is optional.