The AIA Committee on the Environment’s
**MEASURES OF SUSTAINABLE DESIGN AND PERFORMANCE METRICS**

The Top Ten Green Projects Program recognizes projects that demonstrate the highest accomplishment in environmentally sustainable architecture, combining inspired design, systems analysis, and evaluation of performance.

The measures and metrics describe ten criteria for selection. Top Ten entrants are asked to provide narratives responding to the measures, with quantifying metrics where possible. The narrative format allows entrants to describe briefly how the project’s goals were achieved, along with lessons learned that can inform and improve future designs.

While emphasis will be placed on measurable results when available, the narrative format recognizes that qualitative goals are often subjective and therefore cannot always be evaluated quantitatively. Narrative and metrics should refer only to the final built project and not include design measures that were not implemented.

**The COTE definition of sustainability and sustainable design:**
Sustainability envisions the enduring prosperity of all living things. Sustainable design seeks to create communities, buildings, and products that contribute to this vision.

**Measure 1: Design & Innovation**

*Sustainable design is an inherent aspect of design excellence. Projects should express sustainable design concepts and intentions, and take advantage of innovative programming opportunities.*

**Narrative (200 words maximum) may include:**
> Key environmental issues; how and why they became important priorities
> Key ecological goals and concepts for your project and how they shaped your thinking. (Not a list of sustainable design measures.)
> How these goals and concepts were expressed in the design
> Sustainable design innovations.
> How sustainability measures led to a better overall project design
> Process of program analysis and any resource efficiencies realized by innovative programming
> Efforts to “right size” the project and to reduce unnecessary square footage.

**Illustrations (optional) may include:**
> Diagrams that illustrate sustainable design intent
> Diagrams that illustrate sustainable design innovations

**Measure 2: Regional/Community Design**
Sustainability is integrally tied to social, political, cultural and economic issues within communities. Describe how these issues have informed the sustainable elements of this project and how this project has contributed to the greater community.

**Narrative (200 words maximum)** may include:

- How the design relates to social, political, cultural and/or economic issues particular to the local context and larger region
- How the design promotes regional and community connectivity and sense of place, public space and community interaction
- Transportation policies, incentives, and other efforts to provide for those using transportation alternatives
- Site selection criteria to reduce automobile use
- How mandated parking was reduced

**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.

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

Number of parking spaces per person (occupants & visitors): ________

**Measure 3: Land Use & Site Ecology**

*Sustainable design protects and benefits ecosystems, watersheds, and wildlife habitat in the presence of human development.*

**Narrative (200 words maximum)** may include:

- How the development of the project’s site responds to its ecological context, including the watershed, and air and water quality at different scales from local to regional level
- How the development of the immediate site and its buildings contribute to environmental quality
- How the design accommodates wildlife habitat preservation and creation
- How the landscape design protects or creates on-site ecosystems
- How the design responds to local development density (rural to urban) or conditions (brownfield to greenfield)

**Measure 4: Bioclimatic Design**

*Sustainable design conserves resources and maximizes comfort through design adaptations to site-specific and regional climate conditions.*

**Narrative (200 words maximum)**: Describe how the building responds to local climate, sun path, prevailing breezes, and seasonal and daily cycles through passive design strategies.
Narrative may include:
  > Site and climatic analysis
  > Description of internal versus external building loads
  > Design strategies that reduce or eliminate the need for non-renewable energy re-
  > sources
  > How these strategies specifically shaped the building plan, section, and massing
  > How these strategies specifically affected placement, orientation, and shading of
  the building

Illustration: Attach (or describe if not available) a psychrometric or bioclimatic chart profile of
local climate (reference: www.aud.ucla.edu/energy-design-tools) that illustrates bioclimatic
design strategies. Attach a building section (and/or other appropriate diagram) that demon-
strates bioclimatic strategies used. (Use image fields in section 7.)

Measure 5: Light & Air

Sustainable design creates comfortable interior environments that provide daylight, views,
and fresh air.

Narrative (200 words maximum) may include:
  > Design strategies for daylighting, task lighting, ventilation, indoor air quality, views,
      and personal control systems
  > How the project’s design enhances connections between indoors and outdoors
  > Design team approach to integration of natural systems and appropriate technology

Illustration: Photos, drawings or diagrams of daylight and ventilation strategies and/or mod-
eling.

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%). Include all
areas of the building, including stairways, restrooms, and corridors. Identify the percentage of
the total building area adequately served by natural ventilation (with all HVAC systems shut-
down) 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: _______

Measure 6: Water Cycle

Sustainable design conserves water and protects and improves water quality.

Narrative (200 words maximum) may include:
  > How building and site design strategies manage site water and drainage, and capital-
      ize on renewable sources (such as precipitation) on the immediate site
Water-conserving landscape and building design strategies
> Reuse strategies for water including use of rainwater, graywater, and 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.

Precipitation managed on site: _______%

AND: How much potable water is used indoors and outdoors? 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 fresh water suitable for human consumption 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.

Data type: Design / Actual (pick one)
Year: _______ (if applicable)

Total water used indoors: _______ gal/yr
If applicable, please provide gal/pp/day (or yr)

Total water used outdoors: _______ gal/yr

Percent of total water from reclaimed sources. ___%

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.

Percent wastewater reused on-site: _______%

**Measure 7: Energy Flows & Energy Future**

*Sustainable design conserves energy and resources and reduces the carbon footprint while improving building performance and comfort. Sustainable design anticipates future energy sources and needs.*

**Narrative (200 words maximum)** may include:

> How the building design reduces energy loads for heating, cooling, lighting, and water heating
> How the design and integration of building systems contributes to energy conservation and reduced use of fossil fuels, reduces green house gas emissions and other pollution, and improves building performance and comfort.
> Techniques for systems integration, use of controls and technologies, efficient lighting strategies
> Use of on-site renewable and alternative energy systems.
> Anticipation of future and carbon neutral fuel sources
> Strategies to reduce peak electrical demand.
> How the building or parts of the building provide “passive survivability,” the ability to function in the event of power outages or interruptions in fuel supply

**Metrics:** In recognition of the AIA’s commitment to reduce energy use in buildings by 50% by the year 2010, with the goal of carbon neutrality by 2030, please include the following information about your submittal: Insert the project’s percentage energy reduction as defined by the Environmental Protection Agency’s (EPA) Energy Star Target Finder tool. Use the Energy Reduction Target in window #3. Submit actual utility meter or billing data whenever possible for energy use. (Note that a limited number of building types are available for this analysis. For building types not listed on Target Finder, refer to Architecture 2030’s Challenge Target Table at: [www.architecture2030.org/news/targets.html](http://www.architecture2030.org/news/targets.html)) Use actual utility meter or billing data whenever possible. Go to:

http://www.energystar.gov/index.cfm?fuseaction=target_finder.&CFID=1064410&CFTOKEN=92706173

EPA Energy Reduction: ______

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

http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_HERS

HERS Performance Rating ______

Also, determine the 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.) PLEASE REMOVE ALL FIRM NAMES FROM PDF’S. Use the Supplemental Narrative field below to provide details on your base case and energy model.

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.

<table>
<thead>
<tr>
<th>Base Case</th>
<th>Simulation / Actual</th>
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<tbody>
<tr>
<td>Year: _____</td>
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Total annual energy: ___________________ ___________________ Btu/sf/yr

Total annual energy by fuel:

Electricity ___________________ ___________________ Btu/sf/yr
Natural Gas ___________________ ___________________ Btu/sf/yr
Other (Specify) ___________________ ___________________ Btu/sf/yr

Heating: _________________________________ ___________________ Btu/sf/yr
Cooling (If Necessary): _________________________________ ___________________ Btu/sf/yr
Cooling capacity: __________________________ ___________________ sf/ton

Lighting Load Connected: ___________________ ___________________ W/sf
Lighting Load after Controls ___________________ ___________________ W/sf
(estimate used in energy model):

Plug Load (estimate used in energy model): ___________________ W/sf

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 load management and on-site renewable energy generation.

Base Case Simulation / Actual

Identify watt per net sf peak electricity demand: ___________________ W/sf

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.

Percent on-site renewable energy generation _______

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? [http://www.green-e.org/gogreene.shtml] Please identify the sources used and the proportion from each source.

Percent grid-supplied renewable energy _______
Measure 8: Materials & Construction

*Sustainable design includes the informed selection of materials and products to reduce product-cycle environmental impacts, improve performance, and optimize occupant health and comfort.*

**Narrative (200 words maximum) may include:**

> Efforts to reduce the amount of material used on the project.
> Materials selection criteria, considerations, and constraints, such as optimizing health, durability, maintenance, and energy use, and/or reducing the impacts of extraction, manufacturing, and transportation.
> How the building enclosure will perform in relationship to air, moisture, water and thermal characteristics.
> Consideration given to impacts on the environment over the full life cycle and the results of life cycle assessment if available.
> Description of any "green lease" program.
> Construction waste reduction plans and any strategies to promote recycling during occupancy.

**Illustrations may include:**
Up to three images that illustrate concepts or finished details of the building envelope design. (Use image fields in section 7.)

Measure 9: Long Life, Loose Fit

*Sustainable design seeks to enhance and increase ecological, social, and economic values over time.*

**Narrative (200 words maximum) may include:**

> How the project was designed to promote long-term flexibility and adaptability.
> Anticipated service life of the project, and description of any components designed for disassembly.
> Materials, systems, and design solutions developed to enhance versatility, durability, and adaptive reuse potential.

Measure 10: Collective Wisdom and Feedback Loops

*Sustainable design strategies and best practices evolve over time through documented performance and shared knowledge of lessons learned.*

**Narrative (200 words maximum) may include:**

> How you modeled and evaluated the design during the programming and design phases.
> How you evaluated the performance of the built results.
Collaborative efforts between the design team, consultants, client, and community.
How the process enhanced the performance and success of the building.
Lessons learned during the design, construction, and occupation of the building.
How these lessons would change your approach to this project if starting over, or to future projects.
Commissioning and any on-going monitoring of building performance and occupant satisfaction.