AIA COTE Top Ten 1997-2015

Lessons From The Leading Edge

American Institute of Architects
Committee on the Environment

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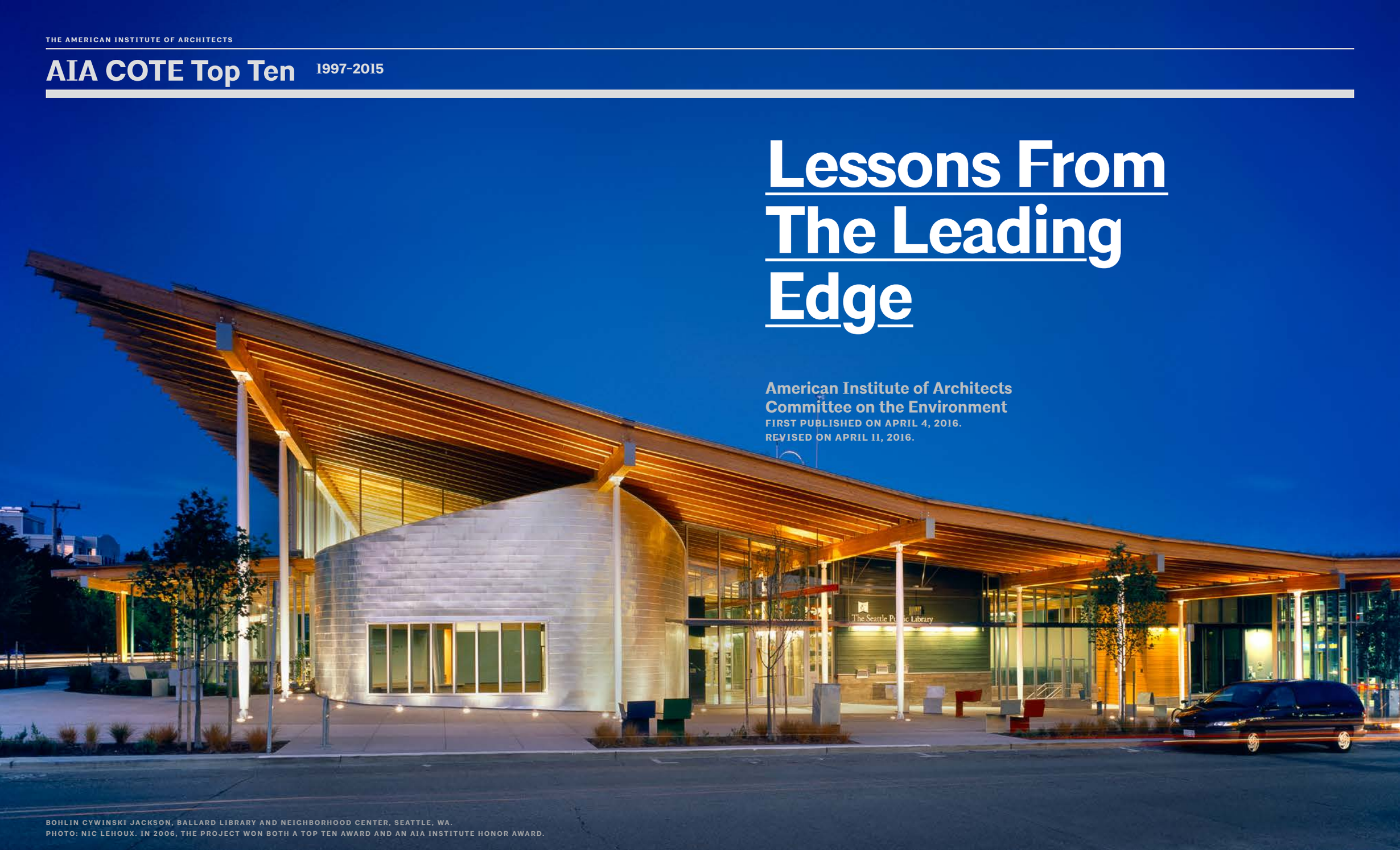

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PHOTO: NIC LEHOUX. IN 2006, THE PROJECT WON BOTH A TOP TEN AWARD AND AN AIA INSTITUTE HONOR AWARD.

Acknowledgements

Dedicated to the memory of Gail Lindsey, FAIA

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Foreword

Bob Berkebile, FAIA BNIM
Founder, AIA Committee on the Environment

Twenty-five years ago, the Committee on the Environment's leadership group was made up of a tiny band of change agents dedicated to promoting a new vision for design. One of our prime targets was the annual AIA national design awards program, the Institute Honor Awards. During 1994-95, there were a series of conversations between COTE and the Committee on Design about modifying the Awards program to include performance standards. After two years without success, the conversation moved to the AIA President and board in '96, but they too felt that performance was too great a burden to impose on AIA members working to deliver beautiful buildings.

In spite of remarkable success with the research and 1994 publication of AIA's Environmental Resource Guide (in partnership with US EPA, environmental groups, scientists, and manufacturers) our inability to change the criteria for good design was considered a major failure by every member of the COTE leadership group—except one. Our youngest member, Gail Lindsey, was undaunted and proposed launching our own awards program. We approached the President and board again with the concept of a short-term pilot program that would not compete with the Honor Awards but would demonstrate over time that beauty and performance are not mutually exclusive. In 1997, Top Ten was born.

Originally COTE agreed that the awards program should sunset in 5-10 years, once all architects understood that great design is not possible without great performance. Two decades later, there remains a need for the program to demonstrate this truth.

Tragically, in 2009, cancer took Gail from us, so she did not live to see how far her brilliant idea would go. In the nearly two decades since Top Ten launched, this program has been the consistently reliable place to explore the "simple yet elegant nature of this approach," as Gail would say. It has been the center of a growing national and global dialogue that has shaped the evolution of high performance design strategies and the new techniques and technologies that are being used to improve performance and redefine beauty. Interestingly, Top Ten has captured the attention of media outlets that otherwise have not covered architectural design awards programs—*USA Today, TIME, Newsweek,* the *Atlantic, Fast Company, National Geographic, Wired, Scientific American, PBS,* and many others. The idea that initially couldn't find a home at AIA now is bringing the Institute a larger audience.

Lessons from the Leading Edge is a critical and timely report that shows how sustainable design has moved from addressing passive design strategies, energy efficiency, and responsible materials to much broader issues, including ecology, economy, human health, social equity, and resilience. Today, advanced sustainable design practices are being applied to projects regardless of building type, scale, budget, or climate.

I am grateful for all the COTE volunteers and jurors who have shepherded this important dialogue and helped redefine what constitutes good design. Thanks to COTE for this important report, and thanks to Gail Lindsey for her transformative gift to our profession.

Introduction

In 1997, the American Institute of Architects (AIA) Committee on the Environment (COTE) launched its flagship initiative, the annual AIA COTE Top Ten Awards, which has become "the profession's best known recognition program for sustainable design excellence," according to the AIA.[1] Every year, the winners attract significant attention in the media as "the most impressive new green buildings."[2]

Top Ten is exceptional in that while most green building evaluation methods consist primarily or exclusively of physical performance criteria—energy, water, materials, etc.—Top Ten aims to honor COTE's mission to "enhance both the design quality and environmental performance of the built environment."[3] As the 2016 call for entries describes, "Sustainability is essential to design excellence, and vice versa. Projects should demonstrate the integration of sustainable performance and design excellence." The nearly 200 winners represent an extraordinary group of case studies from the leading edge of sustainable design over the past two decades.[4]

Yet, while the Top Ten projects have been widely studied and published as individual projects, they have never been examined thoroughly as a group. What can we learn from these exceptional buildings? If they represent the forefront of sustainable design, what can they tell us about how the design industry is evolving?

In 2015, the COTE Advisory Group began a landmark research project to examine the entire group of past Top Ten winners. This report represents the most comprehensive study to date of the Top Ten program.

The researchers set out to ask a number of critical questions:

- Over the past two decades, how has sustainable design evolved, and what strategies are most common at the leading edge?
- How is performance changing over time and in what ways? What topics are becoming more or less popular?
- Are Top Ten projects becoming more diversified—by type, size, location, etc.?
- What can we learn from the leading edge of sustainable design that can help spur wider industry adoption? To what degree have once-innovative solutions become mainstream?
- What role can COTE play in furthering sustainable practices?

Addressing these and other questions promised to cultivate a wealth of knowledge at this critical moment in the evolution of sustainable design.

Additionally, the AIA Technical Design for Building Performance (TDBP) knowledge community's forthcoming case studies of Top Ten and Top Ten Plus winners will focus on identifying effective solutions, opportunities for greater performance, and strategies for improving on past successes. Together, the TDBP and COTE reports will provide unprecedented information about both design strategies and actual performance results for these projects.

1 AIA press release, April 22, 2014. http://www.aia.org/press/releases/aiab103628
2 Xie, 2015
3 AIA/COTE Mission Statement
4 2016 Call for Entries

Summary

As a whole, Top Ten winners demonstrate that advanced sustainable design practices can be applied to a wide range of projects of any scale, type, and budget. They are outpacing industry standards by virtually every measure and showing continual forward progress.

The report concludes with recommendations to encourage more attention on key topics, including integrative design, regional diversity, the health impact of materials, adaptive reuse, post-occupancy evaluations, cost-effectiveness, and indoor environmental quality in large, complex projects.

FIGURE 1 **Summary of Performance, Top Ten Winners, 1997-2015**

CERTIFICATION	
Number of Living Building Challenge projects:	**3** (2%)
Number of LEED Platinum projects:	**40** (21%)

ENERGY	
Average reduction	**56%**
Average since 2011	**64%**
Number of net-zero projects:	**9**

WATER	
Average potable water reduction:	**52%**
Average rain water managed on site:	**80%**

MATERIALS	
Average % local materials:	**36%**
Average recycled content:	**29%**
Average construction waste diverted:	**82%**

INDOOR ENVIRONMENTAL QUALITY	
Spaces with daylight autonomy:	**81%**
Spaces with views of the outdoors:	**91%**
Spaces with operable windows:	**58%**

Background: COTE and Top Ten

Having celebrated its 25th anniversary in 2015, COTE is the building industry's oldest continuous program dedicated to sustainability. Earlier initiatives included the AIA Energy Committee (1973), which involved many of the eventual founders of COTE. Energy consumption remains an essential criterion for building performance, but by the last decade of the 20th Century many architects recognized the need for a broader understanding about how buildings affect the environment. In November, 1990, in Washington, DC, a group led by Bob Berkebile, FAIA, founding Chair of COTE, issued an open invitation to the first meeting. "Our definition of environment is changing," the invitation proclaimed. "From the excavation of raw building materials to air-borne toxins circulating within our offices, buildings have a direct impact on the world around us. Architects are beginning to learn more about preserving, protecting, and securing that world."[5]

During the 1990s, awareness of the environmental and social impact of buildings grew, but there remained little consensus about how to define and pursue sustainability in design. The term "sustainability" itself had just become familiar a few years earlier, in the United Nation's Brundtland Report (1987).[6] The US Green Building Council (USGBC) launched in 1993 but did not introduce its Leadership in Energy and Environmental Design (LEED) rating system until 2000. The building industry urgently needed more clarity about sustainable design, how to practice it, and specific examples.

On Earth Day, 1997, under the leadership of then-Chair Gail Lindsey, FAIA, COTE introduced what then was called the "Earth Day Top Ten" awards in order to celebrate excellence in sustainable design. "We all needed to see and study the best practices," Lindsey said in 2007. "We needed to learn from the exemplars."[7] Berkebile remembers, "We'd been doing the research, publishing reports; it had all been seen as technical stuff. It was very obvious that to transform the profession we had to engage the best designers. That's why the AIA COTE Top Ten program was born."[8]

Two decades ago, few architects were attempting to embrace sustainability in their work. In fact, for the first crop of Top Ten submissions in 1997, the COTE leadership group simply contacted friends and colleagues, people they knew were doing relevant work, and rounded up only fourteen projects from which the original ten winners were selected. "In those early days a lot of us were submitting learning centers, rural scout camps, and

5 COTE records
6 Our Common Future, 1987
7 Gould, 2007
8 Sokol, 2008

Background: COTE and Top Ten

environmental discovery centers—small projects that were generally designed and funded by highly motivated people," Berkebile observed in 2008.[9] Today, several dozen projects are submitted every year, with a wide variety in size, type, and location. "Now we're seeing huge government buildings, office buildings, private developments, headquarters," Berkebile continued. "That's a pretty significant transformation. That doesn't mean the industry has been transformed, but it's in that early phase of significant change."

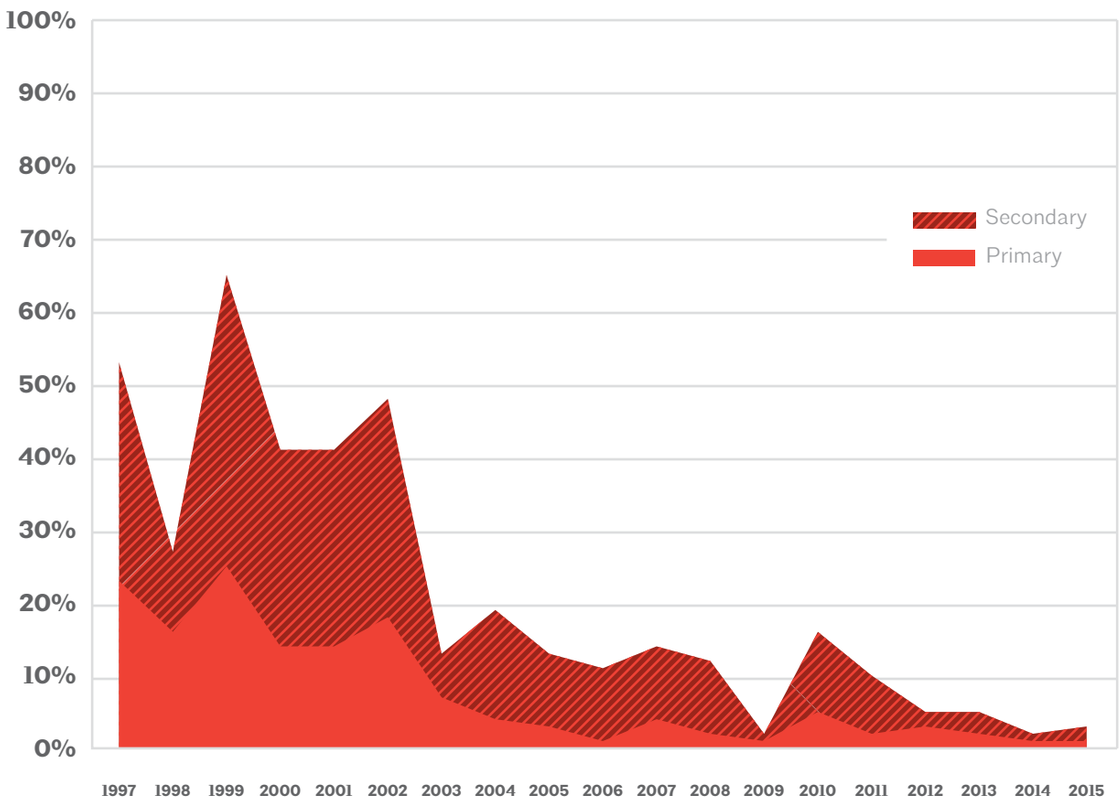
Design quality also has improved, as growing awareness about sustainability has brought smarter thinking to more projects. "Our first winner would not win today," 2008 COTE Chair Henry Siegel, FAIA, has said.[10] "The project that was breaking new ground in the beginning would fall in the middle of the pack today."

In addition to LEED and other efforts to mainstream green, progress toward sustainable design certainly relates directly to the efforts of the AIA and COTE itself. In 2005, the AIA adopted the 2030 Challenge, which seeks carbon neutrality by that year, and in 2009 it launched the AIA 2030 Commitment to give architects a framework for reporting their projects. In 2014, after years of COTE efforts, the AIA Board voted to include sustainability metrics in the annual Institute Honor Awards. The Top Ten program continues to expand and evolve. In 2013, COTE introduced the "Top Ten Plus" Award to recognize a past winner with compelling post-occupancy data and lessons learned about "the most prominent benefits of the building in use," as well as unanticipated challenges. In 2015, COTE introduced the Top Ten for Students Awards program, administered by the Association for Collegiate Schools of Architecture (ACSA), to celebrate academic projects developed around the Top Ten measures and metrics. In 2016, COTE began requiring that submitting firms sign the 2030 Commitment. The continued effort to raise the bar appears to be making a difference: as 2015 judge Alex Wilson put it, "There's clearly been a trend toward very high performance buildings."[11]

9 Ibid.
10 Ibid.
11 Madsen and O'Malley, 2015

Data Collection And Analysis

FIGURE 2 **Unavailable data for Top Ten Winners, 1997-2015:**



From 1997 to 2015, there were 189 AIA COTE Top Ten winners. (The 2005 jury selected only nine.) In addition, there have been five "honorable mentions" (2007-2008); these are not included in the research. In 2015, the researchers collected all available information, focusing on performance metrics, for every winning project and all submissions to the program since 2012 (300+ projects).

The research and analysis relied primarily on information provided by submitting project teams, and little of this information is easily verified by other sources. Sources of information included the following:

- AIA websites
- Archived AIA and COTE records
- Interviews with AIA staff, COTE leadership, project teams, and others
- Architects' websites
- Media coverage
- Other sources as noted

The researchers divided all the data into primary and secondary information. Primary data includes general project information (size, location, etc.) and basic metrics (energy, water, etc.). Secondary data includes other performance metrics, much of which was requested in some years and not others and therefore is inconsistent.

The data is riddled with gaps. In the earliest years, project submissions consisted of little more than a few photographs and some informal text, so for the first five years, approximately half the information does not exist. In later years, many project teams submitted incomplete information, but for the past decade this represents less than 10% of the data. Even with these gaps, the current report provides the most exhaustive research to date on the Top Ten program.

Much of the data analysis in this report uses scatterplot charts to illustrate a simple linear regression model, a standard statistical method comparing two variables. Commonly used as a forecasting tool, regression uses the historical relationship between an independent and a dependent variable to predict the future values of the dependent variable. Most scatterplots in this report track change over time, where the X axis represents years. A trendline uses a mathematical formula to find a single line with minimal distance to all points and may pass through all, some, or none of the points. For the purposes of this report, scatterplots are intended only as very general visual indications of possible future trends.

Note that in many scatterplot charts, multiple projects with the same value in one year are represented by single nodes, so graphically there may appear be fewer than ten projects that year.

General Trends

FIGURE 3 Top Ten Winners and LEED Ratings, 1997-2015

LEED RATING	ALL LEED*	ALL TOP TEN**	LEED-CERTIFIED TOP TEN***
Certified	21%	2%	4%
Silver	32%	3%	8%
Gold	39%	13%	32%
Platinum	6%	21%	52%

* Percentage of all LEED-certified buildings ever built, by rating level. Source: GBIG.

** Percentage of all 189 Top Ten projects.

*** Percentage of the 77 Top Ten projects that are LEED-certified.

Over the years, the sizes, types, and locations of Top Ten winners have varied dramatically, ranging from small houses to large medical complexes to huge community plans. The growing diversity demonstrates that exemplary sustainable design can be achieved in any project type of any size in any climate.

THIRD-PARTY RATING SYSTEMS

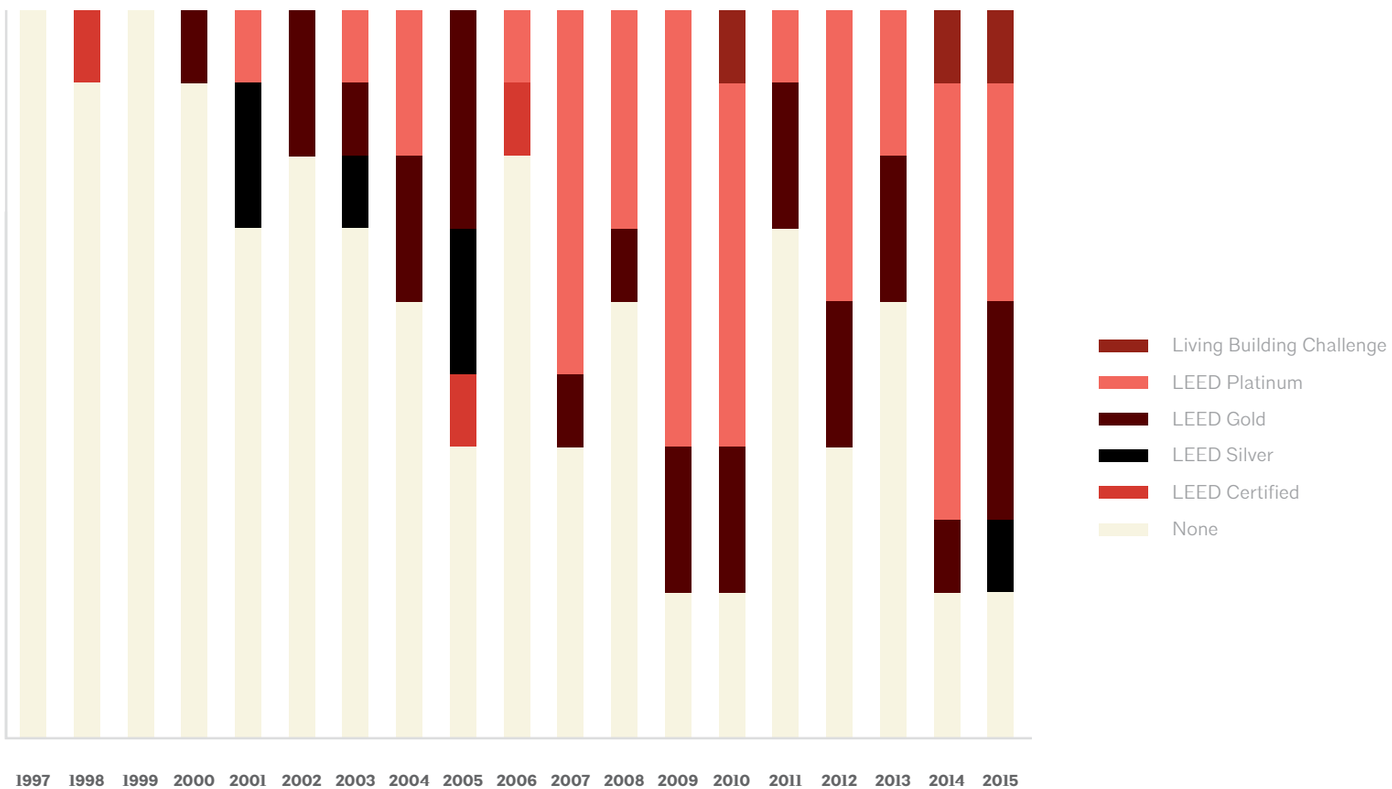
Most third-party green building rating systems, including LEED, did not exist when AIA COTE Top Ten launched in 1997, much less when the early winners were developed, earlier that decade. (The pilot of LEED was introduced in 1998, and LEED 2.0 appeared in 2000.) According to information reported by project teams, 77 projects, or 41% of all winners, have achieved LEED certification or were pending at the time of submission; among those, 52% (40 projects) were reported as LEED Platinum.[12] According to Green Business Certification Inc. (GBCI), only 6% of all LEED certified projects ever built are Platinum. Over the years, LEED performance has significantly increased among Top Ten winners. Since 2010, the majority of all projects (57%) have been identified as LEED Platinum (37%) or Gold (20%). Top Ten projects also have included three of the eight fully certified Living Building Challenge (LBC) projects built to date (as of December, 2015).[13]

[12] GBIG. (Retrieved February 15, 2016.)

[13] ILFI, Living Building Challenge Certified Projects. (Retrieved February 15, 2016.) living-future.org/living-building-challenge/case-studies/certified-projects

General Trends

FIGURE 4 Top Ten Winners and third-party rating systems, 1997-2015:



PROJECT TYPES

Over the course of the Top Ten program, the diversity of project types has grown. Early on, office buildings were the largest single category, representing 30-40% of all winners. Recent years have seen more balance between project types, with residential and public projects especially growing. This trend could signal wider adoption of green building across various markets.

Note that many projects have multiple uses, but Top Ten submission forms do not specify what percentage of the project is devoted to each use. To calculate percentages, the researchers equally divided multiple uses in single projects, and the percentages by year do not always divide into increments of 10%.

Among all Top Ten winners since 1997, Offices, Educational, and Public projects are roughly evenly divided and cumulatively account for 71% of all winners. ("Public" projects include anything built by a federal, state, or local government agency.) Residential projects, at 12%, are the next largest category, although only 13 single-family houses have won Top Ten. The USGBC lists Commercial Offices, Residential, and Healthcare as the three markets with "the highest penetration of green building," while healthcare accounts for only 3% of Top Ten winners, so this project type appears to be significantly underrepresented in Top Ten.

AIA COTE Top Ten 1997-2015

General Trends

FIGURE 5 **Top Ten project types by percentage, 1997-2015**
Many projects have multiple uses, so percentages by year do not always divide into increments of ten.

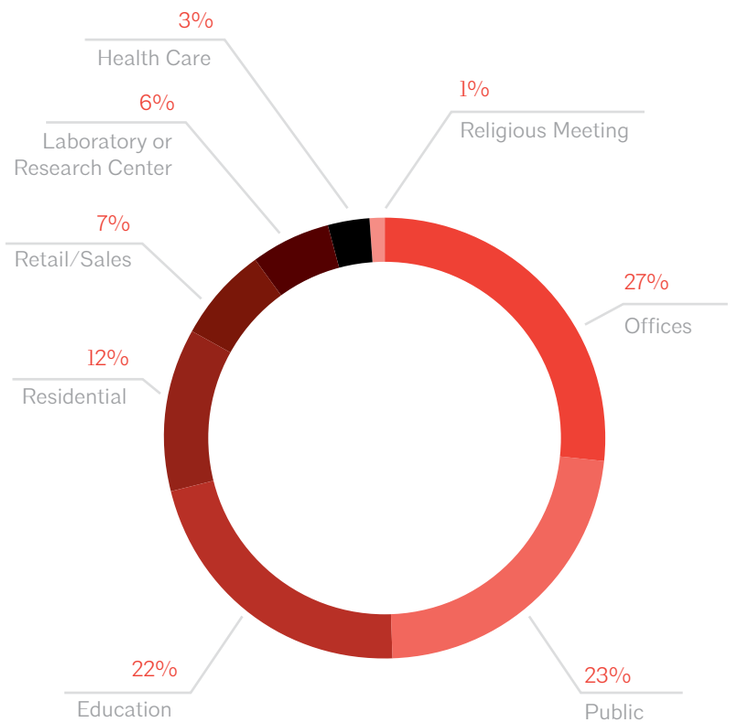
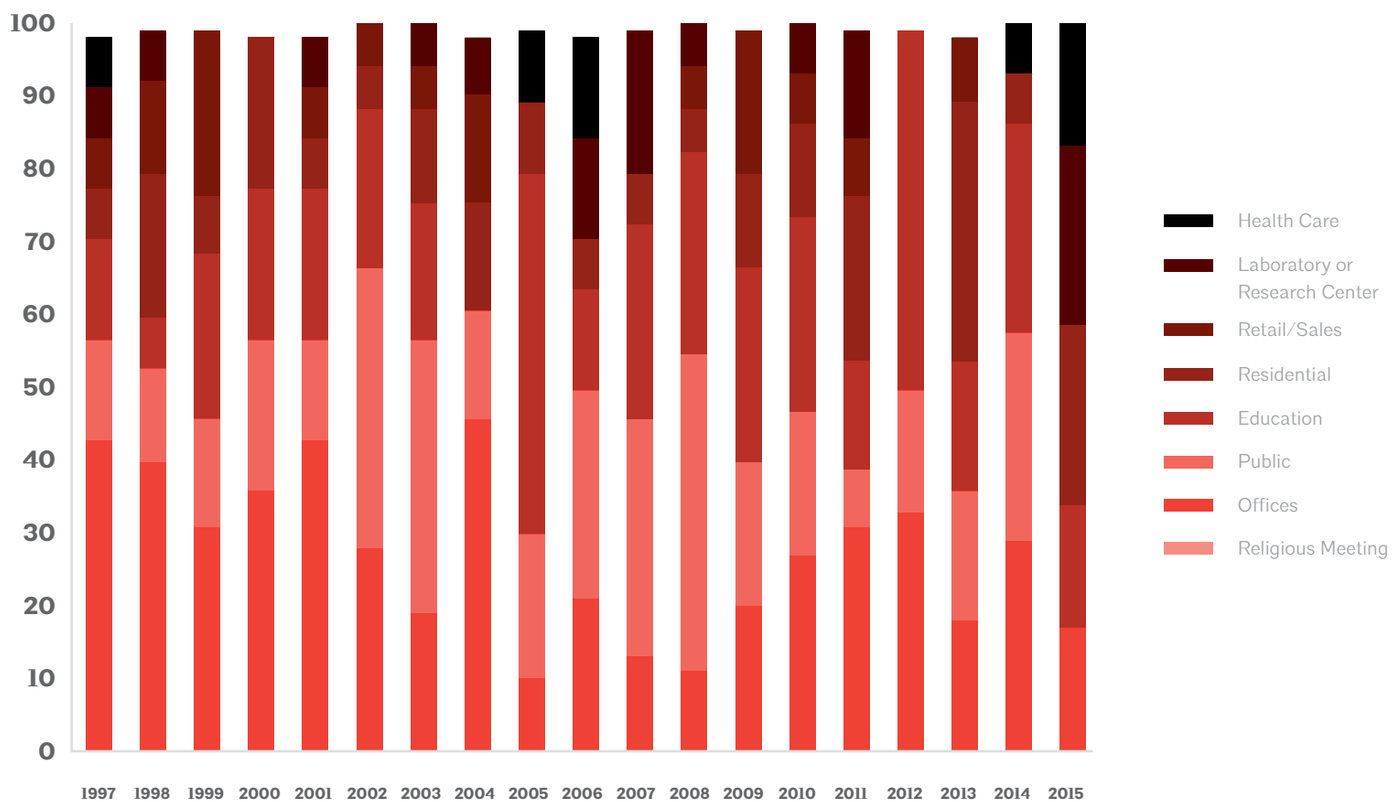
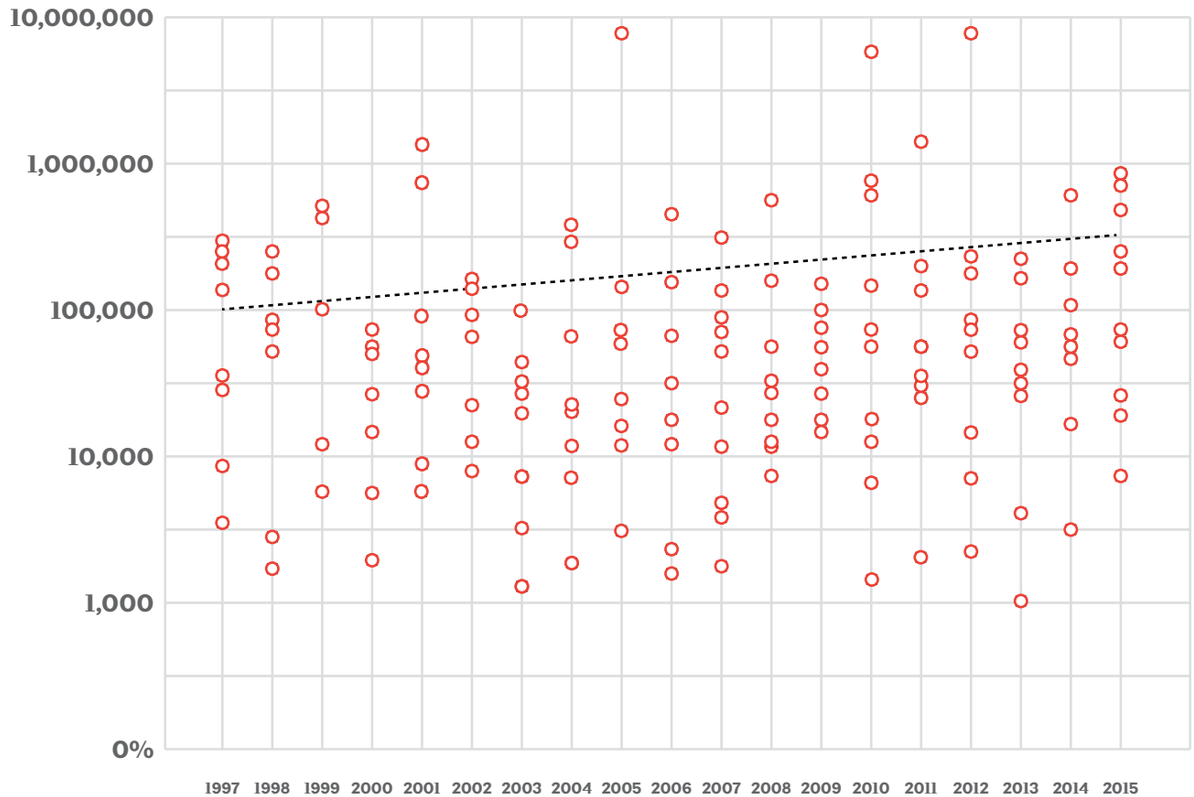


FIGURE 6 **Top Ten project types by year, 1997-2015**
Many projects have multiple uses, so percentages by year do not always divide into increments of ten.



General Trends

FIGURE 7 **Sizes of Top Ten winners by year, 1997-2015**
(in square feet)



PROJECT SIZES

Top Ten winners generally remain relatively small: 70% fall under 100,000 square feet, and approximately half (54%) are under 50,000 square feet. This is consistent with other research showing, for example, that the average size of LEED Platinum projects to be well under 100,000 square feet.[14] Size is not known for eight (4%) of the 189 winning projects. However, between 1997 and 2015, the average size of the ten annual winners more than doubled, due to a few outlier projects at very large scales, and in 2015 the median size exceeded 100,000 square feet for the first time. These trends could suggest that architects are becoming more successful at incorporating sustainable design strategies at larger scales.

Average project size: 211,065 square feet

Median project size: 40,000 square feet

Smallest project: Tofte Cabin, Sarah Nettleton Architects (2002 winner), 950 square feet

Largest built project: King Abdullah University of Science and Technology, HOK (2010 winner), 5,340,000 square feet

Largest designed project: Lloyd Crossing Sustainable Design Plan, Mithun (2005 winner), 8,000,000 square feet

[14] Todd and Tufts, 2012

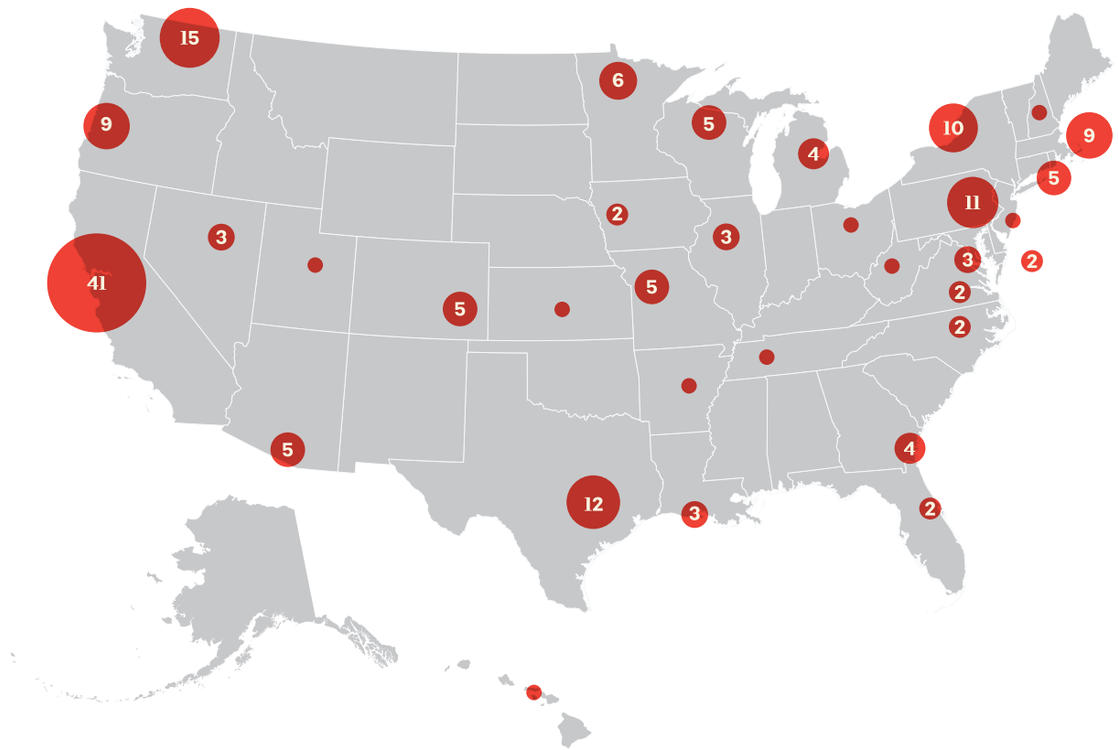
General Trends

SMALLEST WINNER: TOFTE CABIN (2002)

LARGEST BUILT WINNER: KAUST (2010)

General Trends

FIGURE 8 Top Ten winner locations by U.S. state, 1997-2015



2015

PROJECT LOCATIONS

As of 2015, 97% of Top Ten winners are located in North America.[15] Of the 189 winners, all but 11, a total of 94%, are located in the United States. Six of the remainders are in Canada: four in British Columbia, and the other two in Ontario and Manitoba. Only five projects to date are located outside North America—one each in Argentina, Germany, the Netherlands, Saudi Arabia, and Lebanon.

Project locations by country:

United States:	**178 (94%)**
Canada:	**6 (3%)**
British Columbia:	**4**
Argentina:	**1**
Germany:	**1**
The Netherlands:	**1**
Saudi Arabia:	**1**
Lebanon:	**1**

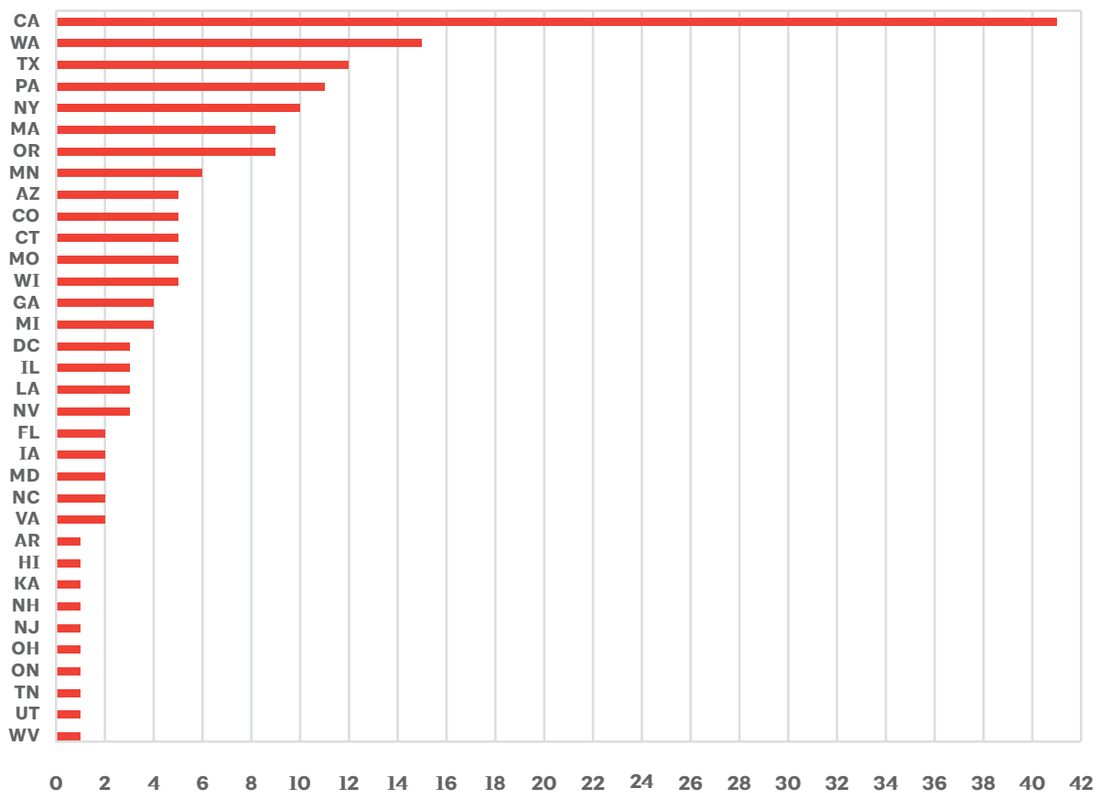
Top Ten projects have yet to be built in 16 US states, including one whole region—the Upper Great Plains, consisting of Idaho, Montana, Wyoming, Nebraska, and the Dakotas. A relatively large portion of the Southeast, including Mississippi, Alabama, and South Carolina, also has no winners yet.

Despite the relative geographic diversity in the US, one region dominates. Of the 189 winners, 41 (22%) are located in California—nearly triple the number in any other state. Including Oregon and Washington, over a third of the winners are on the West Coast. What explains this? "I would attribute

[15] For an interactive map of most Top Ten projects, see the GBIG. gbig.org/collections/14548/map

General Trends

FIGURE 9 **Number of Top Ten winners per U.S. state, 1997-2015**
A third of all Top Ten winners are located on the West Coast of North America.



this to a combination of a more temperate climate, greater governmental involvement, and arguably more progressive clients in the major cities," offers Bill Leddy, FAIA, 2013 Chair of COTE and winner of six Top Ten awards.[16] The climate facilitates passive design more easily than many other regions, and California's culture and clientele are extremely progressive in embracing sustainability. The state's economy is the world's seventh largest but least carbon intensive, next to France, according to a 2015 report.[17] California's green building incentives, such as tax rebates, are plentiful, and standards for building performance are high, with Title 24 requirements exceeding the energy code for most other areas.[18] The "Rosenfeld Effect" reveals that in the three decades following the passage of Title 24, electricity use per capita nearly flattened in California, while it rose 50% in the rest of the United States.[19]

"What single thing would make it easier to make excellent sustainable architecture?" Leddy recalls an audience member at a 2013 Top Ten presentation asking. Another attendee blurted out in response, "Apparently, move my practice to California."[20]

Adjusting for state population yields a very different result, however. Using Census information for 2015[21] to calculate the number of Top Ten winners per capita reveals that the District of Columbia has twice the ratio of any state. This is consistent

16 Correspondence with the author, December 29, 2015

17 Next10, "California Green Innovation Index," 2015. next10.org/sites/next10.huang.radicaldesigns.org/files/2015-Green-Innovation-Index.pdf

18 "Energy Incentive Programs, California," US Department of Energy, update March 2015. energy.gov/eere/femp/energy-incentive-programs-california. California Energy Commission. http://www.energy.ca.gov/title24

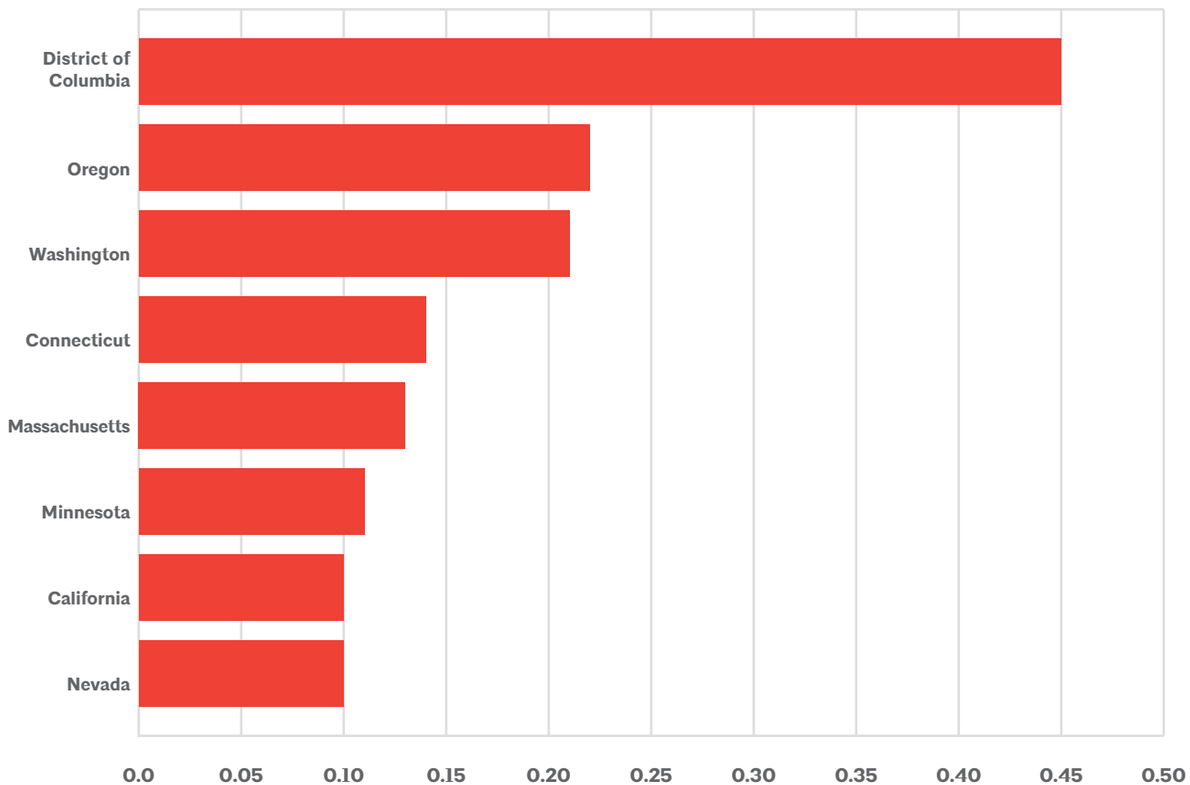
19 Arthur H. Rosenfeld with Deborah Poskanzer, "A Graph Is Worth a Thousand Gigawatt-Hours," California Energy Commission, 2009. energy.ca.gov/commissioners/rosenfeld_docs/INNOVATIONS_Fall_2009_Rosenfeld-Poskanzer.pdf

20 Correspondence with the author, December 29, 2015.

21 "State Totals: Vintage 2015," US Census Bureau. (Retrieved February 15, 2016.) census.gov/popest/data/state/totals/2015/index.html

General Trends

FIGURE 10 **Top Ten winners per 100,000 residents per U.S. states, 1997-2015**

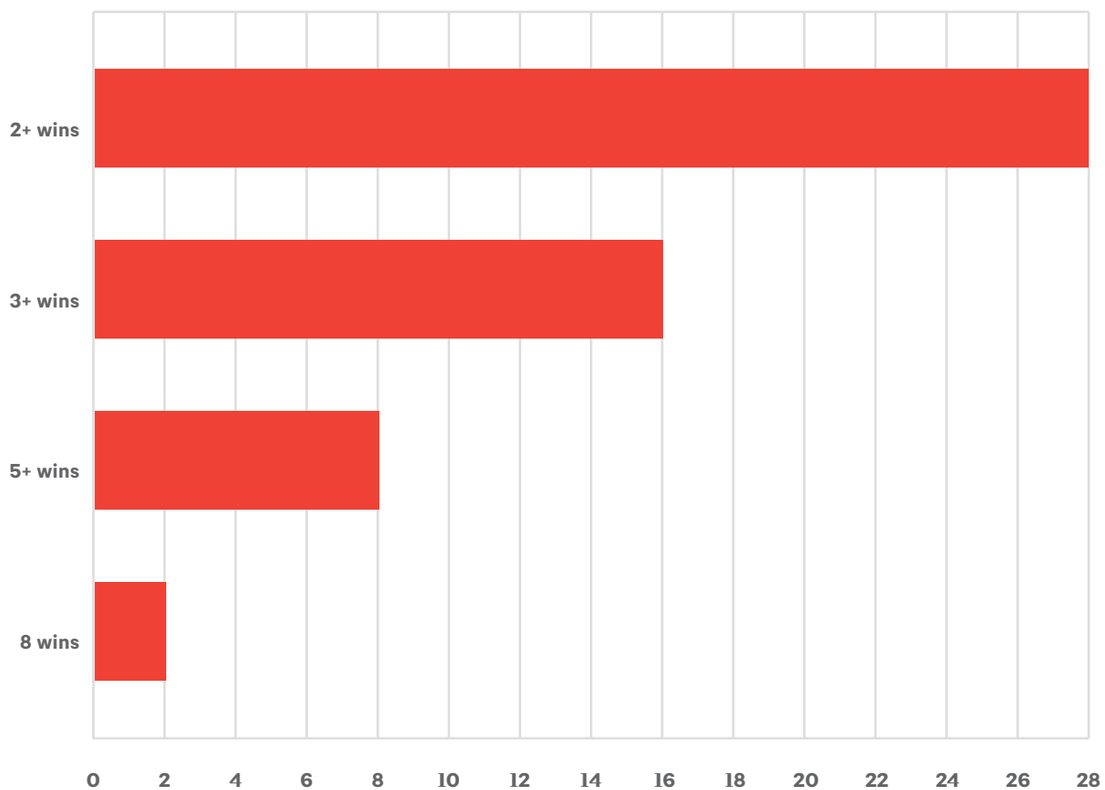


with USGBC statistics showing that DC also has the largest per-capita area of LEED-certified buildings.[22] Next, Oregon and Washington State tie, with slightly more than two projects per million residents. Connecticut and Massachusetts are similar, with 1.3-1.4 projects per million, while California, Minnesota, and Nevada all have just over one per million.

[22] Marisa Long, "USGBC Releases the Top 10 States for LEED Green Building Per Capita in Nation," USGBC, February 4, 2015. usgbc.org/articles/usgbc-releases-top-10-states-leed-green-building-capita-nation

General Trends

FIGURE 11 **Number of design firms with multiple Top Ten Awards, 1997-2015**



DESIGN ARCHITECTS

Between 1997 and 2015, a total of 127 design firms won 189 Top Ten awards, an average of 1.5 projects per firm, although several combined forces as joint ventures on single projects. Winning firms range from single practitioners to very large global companies with thousands of employees, and 28 (22% of all firms) have won multiple awards.

Two firms—HOK and Lake|Flato—have won an impressive eight awards each. All but one of HOK's awards occurred in the first several years, while Lake|Flato did not win its first award until 2006. In the past decade, Lake|Flato has won twice as many Top Ten awards as any other firm. With seven wins between 1998 and 2015, Miller Hull ranks in the top three firms and arguably is the most regularly awarded firm, garnering a Top Ten every two to three years since the beginning of the program.

Consistent with the findings above that the West Coast dominates project locations, firms in that region also are leading the pack. Of the 16 architecture firms that have won more than two Top Ten awards, half are located on the West Coast. Of the eight firms that have won five or more awards, a majority are in that region.

Of the 28 firms with multiple wins, larger firms appear to have an advantage. According to the AIA, 97% of its more than 83,000 members are employed by firms with fewer than 50 employees (approximately 71%) or sole practitioners (26%), and the remaining three percent have larger staffs.[23] However, these statistics reverse among regular Top Ten winners, nearly two-thirds of whom are in the larger category. Smaller firms (under 50) account for nearly all of AIA members but only 39%

[23] AIA, "Facts, Figures, and the Profession"

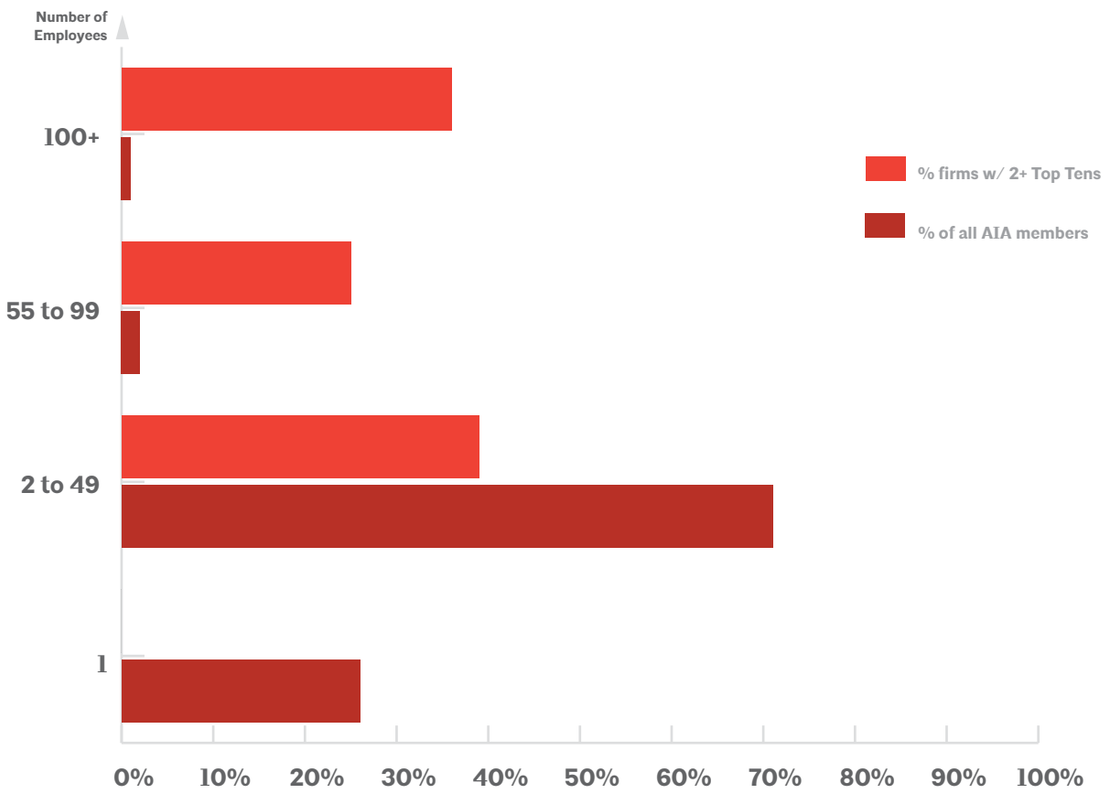
General Trends

FIGURE 12 Architecture firms with multiple Top Ten Awards, 1997-2015

RANK	WINS	FIRM	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	8	HOK						x2													
	8	Lake|Flato										x2									
2	7	Miller Hull																			
3	6	BNIM																			
	6	Leddy Maytum Stacy																			
4	5	Brooks + Scarpa															x2				
	5	EHDD																			
	5	Mithun																			
5	4	Croxton Collaborative																			
	4	KieranTimberlake																			
	4	Perkins+Will													x2						
	4	Siegel & Strain																			
6	3	Bohlin Cywinski Jackson																			
	3	Susan Maxman & Partners																			
	3	William McDonough + Partners																			
	3	SERA																			
7	2	Architerra																			
	2	Arkin Tilt																			
	2	Behnisch																			
	2	Kubala Washatko																			
	2	LHB				x2															
	2	Mahlum																			
	2	Overland Partners																			
	2	Ross Barney																			
	2	SmithGroupJJR																			
	2	TVS																			
	2	VJAA																			
	2	ZGF																			

General Trends

FIGURE 13 Sizes of design firms with multiple Top Ten Awards, 1997-2015



of the firms with multiple Top Ten Awards. At the two extremes, four very large firms (500+ employees) have won multiple Top Tens, while no sole practitioner ever has.

What accounts for these facts? The AIA reports that large firms (100+ employees) represent only one percent of members but a quarter of the profession's total billings, while sole practitioners represent a quarter of members but only two percent of its billings.[24] Larger firms may have more success with Top Ten Awards simply because they have more work and therefore more opportunity for success.

But larger firms also have more people, of course. The integrative design process, a cornerstone of high-performance design, entails close collaboration among a diverse group of stakeholders. "No one knows as much as everyone," declares the website of BNIM, winner of six Top Ten Awards. "Individual ideas are improved upon by our designers and collaborators to form a continual and collective cycle of innovation."[25] As organizational strategists Ron Ricci and Carl Wiese put it, "Good ideas come from anywhere, so the more voices the better."[26] Surveys show that larger architecture firms tend to invest more per capita in educational initiatives, research, cultural activities, and opportunities for collaboration.[27]

More in-depth research would be useful to study the effects of size, structure, and culture on a firm's ability to perform consistently well.

24 Ibid.

25 BNIM website. Retrieved February 15, 2016. bnim.com/people

26 Ron Ricci and Carl Wiese, The Collaboration Imperative: Executive Strategies for Unlocking Your Organization's True Potential (Cisco Systems, 2011)

27 Jane F. Kolleeny and Charles Linn, "Size Affects Firm Culture," Architectural Record, June, 2002

Lake|Flato

SAN ANTONIO, TEXAS

In the past decade, Lake|Flato has won twice as many AIA COTE Top Ten awards as any other firm. What explains their historic run?

"We do a really good job organizing integrated design charrettes for each of our projects," says co-founder David Lake, FAIA.[28] "Early in the process, before we even think about design, before we even know what the building looks like, we set goals for performance, resource conservation, and site contextual cues that are put up for everyone to see. Everyone is there—building owner, building users, and the entire design team, not just the principals. If everyone sees these early, everyone knows what we're heading toward."

"Creating buildings that passively perform better is an opportunity to push us further through engineering," adds Heather Holdridge, Lake|Flato's Sustainability Director. "We see the beauty and integration of engineering as helping push the quality of design. It's not another layer—it's integral."

[28] Correspondence with the author, January 13, 2016

LAKE|FLATO, WORLD BIRDING CENTER, MISSION, TX (2006 WINNER). PHOTO: PAUL HESTER.

Evaluation Criteria: Top Ten Measures & Metrics

While interest in green building has grown dramatically over the past two decades and now accounts for an estimated half of all commercial construction in the U.S.,[29] the definition of sustainability can be elusive. "The term is very moldable," 2013 Top Ten judge Gail Vittori has said. "It can be very expansive and include anything from social equity to ecological concerns, human health and the economy."[30] In 2006, a decade and a half after forming, COTE recognized the need for a clearer vision and articulated its official definitions of sustainability:[31]

AIA/COTE DEFINITIONS 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."**

In the past decade, this vision has been adopted by many organizations and programs and cited extensively in various publications. (See References.) Yet, how do architects put this vision into practice? Before the USGBC introduced LEED in 2000, the building industry saw little consensus about what constitutes a "green building," and debates still linger. The Top Ten program was launched primarily to illustrate best practices at any given time.

In the first handful of years, judging was informal. Submissions consisted of little more than photographs and some text. The COTE Advisory Group (then called the Executive Committee) evaluated the entries themselves, and some of the early winners actually were projects submitted by the judges themselves.

In 2002, COTE began to give the program more rigor by bringing in outside judges and outlining clear criteria for evaluation. Every year since then, a different group of third-party experts has served as judges, and architects on the jury do not submit projects. Since 2008, COTE started enlisting a separate technical committee of engineers and building scientists to provide expert review of the performance metrics prior to the jury deliberation.

In 2005-2006, the Top Ten Measures and Metrics were substantially revised. While the ten general categories have remained intact, the metrics and details have continued to evolve, reflecting the industry's growing sophistication about sustainable design. What has remained consistent is the program's aim to celebrate the intersection of great design and great performance. As the 2016 call for entries states, Top Ten "recognizes exemplary and innovative built projects that establish a standard of over-all design excellence that creatively integrates sustainable design strategies, demonstrating their benefits while educating and inspiring the profession and the public."

How best to evaluate both qualitative and quantitative factors has been an ongoing challenge. "One of the big questions is what we're trying to measure," 2000-2001 COTE Chair Sandy Mendler has said. "Is it intentions or results? The term 'sustainable design' implies that we're focusing on the design process—a set of intentions and goals. Ideally, those goals translate into the built project, but not necessarily."[32] In

29 USGBC, "Green Building Facts," 2015

30 Lance Hosey, "A Force of Nature," Huffington Post, November 16, 2015. huffingtonpost.com/lance-hosey/force-of-nature_b_8569928.html

31 See COTE Mission. Kira Gould and Lance Hosey wrote these definitions in 2006 on behalf of the COTE Advisory Group, which adopted them formally that year.

32 Quoted in Gould and Hosey, *Women in Green* (2007), 110

Evaluation Criteria: Top Ten Measures & Metrics

2013, COTE introduced the "Top Ten Plus" award to recognize past winners that demonstrate exemplary post-occupancy performance. In 2016, the Top Ten entry forms began requesting both predicted and actual energy performance for those projects that have this information. However, with the exception of the three Top Ten Plus winners to date (2013-2015), the 189 Top Ten winners have been evaluated primarily on the quality of design and the predicted performance.

While many design awards programs, including others within the AIA, require only brief narratives and a limited number of photographs, Top Ten maintains extremely ambitious submission requirements, including narratives and performance metrics in ten categories, in addition to photographs, drawings, and diagrams. The performance metrics are clear quantitative indicators of performance, while photographs and some 1,000 or more words of text give juries extensive opportunity to review the quality of the project's design, process, and quality.

To date, the Top Ten program has not set minimum performance requirements for submission or winners, which have been chosen through consensus by the annual jury. In 2015, the call for entries began emphasizing that "submissions are expected to make every effort to comply with the goals of the AIA 2030 Commitment," but this has yet to become a requirement. Nevertheless, as this report shows, Top Ten winners still have exceeded industry standards for nearly every aspect of performance.

Today, COTE's "Measures of Sustainable Design" include a broad range of criteria indicating a project's social, economic, and environmental impact. The remainder of the report is organized around these ten categories.

THE AIA COMMITTEE ON THE ENVIRONMENT'S MEASURES OF SUSTAINABLE DESIGN

MEASURE 1:
Design & Innovation

MEASURE 2:
Regional/Community Design

MEASURE 3:
Land Use & Site Ecology

MEASURE 4:
Bioclimatic Design

MEASURE 5:
Light & Air

MEASURE 6:
Water Cycle

MEASURE 7:
Energy Flows & Energy Future

MEASURE 8:
Materials & Construction

MEASURE 9:
Long Life, Loose Fit

MEASURE 10:
Collective Wisdom and Feedback Loops

Measures

MEASURE 1:
DESIGN & INNOVATION

MEASURE 2:
REGIONAL/COMMUNITY DESIGN

MEASURE 3:
LAND USE & SITE ECOLOGY

MEASURE 4:
BIOCLIMATIC DESIGN

MEASURE 5:
LIGHT & AIR

MEASURE 6:
WATER CYCLE

MEASURE 7:
ENERGY FLOWS & ENERGY FUTURE

MEASURE 8:
MATERIALS & CONSTRUCTION

MEASURE 9:
LONG LIFE, LOOSE FIT

MEASURE 10:
COLLECTIVE WISDOM AND
FEEDBACK LOOPS

Measure 1 Design & Innovation

EHDD, David and Lucile Packard Foundation Headquarters

LOS ALTOS, CA
2014 WINNER

The design team aligned the building with the street grid, 40 degrees off true north, in order to be "good neighbors," according to the submission. The building then was shaped to compensate for less-than-optimal solar orientation, with the massing, roof overhangs, interior and exterior blinds adjusted to minimize solar gain. This reduced the energy penalty to less than 5%, compared to an optimally oriented building, and ultimately the building achieved net zero energy. The length, width, and height of the central courtyard are proportioned to create a comfortable scale and microclimate, and in the first year occupants reported that the courtyard and adjacent common spaces improved their quality of life and sense of community.

Photo: Jeremy Bittermann.

Measure 1: Design & Innovation

"Sustainability is essential to design excellence, and vice versa. Projects should demonstrate the integration of sustainable performance and design excellence by highlighting how the design was shaped around the project's goals and performance criteria."

2016 CALL FOR ENTRIES

The first measure goes directly to COTE's mission. As the call for entries states, the program puts "particular emphasis on design excellence," and "a key criterion for judging projects is the integration of compelling design and sustainable performance." The narrative requirement includes specific guidance on this, asking "how sustainability measures led to a better overall project design." This is quite different from other green building assessment programs, which typically consider performance alone. Henry Siegel, 2008 COTE Chair and four-time AIA COTE Top Ten winner, summed it up in 2007: "Design awards reward aesthetics. LEED ratings reward performance. The Top Ten program does both."[33]

Yet, while Top Ten and other AIA awards celebrate "design excellence," the term remains vague. In 2012, the AIA Committee on Design (COD) organized a conference discussion entitled, "What is Design Excellence?" According to a report by John Morris Dixon, FAIA, the panelists "offered many provocative observations, but no consensus developed."[34] The same year, an AIA task force advising the U.S. State Department on the same topic concluded, in the words of John Ruble, FAIA, "Design Excellence is a process, not a fixed set of criteria."[35] Top Ten addresses the elusiveness of "design excellence" in the submission form: "While emphasis

33 Quoted in Gould, "Celebrating Green," 2007

34 Dixon, "Defining Architectural Design Excellence," 2012

35 Quoted in Zach Mortice, "State Department to Adopt AIA Recommendations for Design Excellence in Embassies," AIA, 2009. aia.org/practicing/AIAB082776

Measure 1: Design & Innovation

FIGURE 14 **Projects with both Top Ten and Institute Honor Awards, 1997-2015**

TT	IHA	PROJECT	DESIGN FIRM
2014	2011	US Land Port of Entry	Snow Kreilich
2013	2014*	Pearl Brewery / Full Goods Warehouse ***	Lake|Flato
2011	2010	Step Up on 5th ***	Brooks + Scarpa
2011	2013	Vancouver Convention Centre West ***	LMN
2010	2014**	355 11th Street ***	Aidlin Darling
2009	2009	Charles Hostler Student Center	VJAA
2009	2009	World Headquarters for IFAW	designLAB
2007	2008	Heifer International Headquarters ***	Polk Stanley Wilcox
2006	2006	Ballard Library and Neighborhood Center ***	Bohlin Cywinski Jackson
2006	2007	Solar Umbrella House ***	Brooks + Scarpa
2006	2007	World Birding Center Headquarters ***	Lake|Flato
2005	2006	Lloyd Crossing Sustainability Plan ***	Mithun
2004	2003	Colorado Court Affordable Housing	Brooks + Scarpa

*Institute Honor Award for Urban Design, Pearl Brewery Redevelopment Master Plan

**Institute Honor Award for Interiors, Bar Agricole

***Projects also picked by this report's Measure 1 Committee

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."[36] Assembling industry leaders as judges is how awards programs, including Top Ten, typically evaluate the design quality of projects.

Given the absence of specific metrics for design excellence, evaluating nearly 200 projects spread over two decades is challenging. Are there meaningful ways to quantify the qualitative or measure the seemingly immeasurable? Can we use Top Ten winners to assess progress toward COTE's longstanding goal of "making environmental considerations and sustainable design integral to the practice of architecture"?[37]

One place to start is the Institute Honor Awards, which the AIA describes as "the profession's highest recognition of works that exemplify excellence in architecture, interior architecture and urban design."[38] By AIA standards, projects that have won both a Top Ten Award and an Institute Honor Award represent excellence in both design and sustainability, and 13 projects fall into this category. A banner year was 2006, with three Top Ten winners also winning Honor Awards that year or the following year.

Two firms—Lake|Flato and Brooks + Scarpa—have designed projects which have won both awards more than once. "Consistently for us, good design means good performance," says Angela Brooks, FAIA, Managing Principal of Brooks + Scarpa, winner of four Top Tens, three which of which also have won Institute Honor Awards. "We have never separated the

36 2016 Top Ten submission form

37 "2000 Earth Day Top Ten," yumpu.com/en/document/view/5689616/2000-earth-day-top-ten-world-resources-institute, April 22, 2000.

38 "2016 AIA Institute Honor Awards Recognize Excellence in Architecture, Interiors, and Urban Design," aia.org/press/releases/AIAB107958, January 15, 2016.

Measure 1: Design & Innovation

FIGURE 15 **Measure 1 exemplars chosen by a committee of 12 former Top Ten judges (2+ votes)**

	YEAR	PROJECT	DESIGN FIRM	VOTES
1	2014	Packard Foundation Headquarters	EHDD	7 (58%)
2	2014	Edith Green Wendell Wyatt Federal Building Modernization	SERA	6 (50%)
3	2007	Sidwell Friends School	KieranTimberlake	5 (42%)
4	2012	ASU Polytechnic Academic District	Lake|Flato	5
5	2015	The Bullitt Center	Miller Hull	4 (33%)
6	2014	John & Frances Angelos Law Center	Behnisch	4
7	2011	Vancouver Convention Centre West *	LMN	4
8	2010	355 11th Street *	Aidlin Darling	4
9	2010	Omega Center for Sustainable Living	BNIM	3 (25%)
10	2010	Kroon Hall	Hopkins	3
11	2009	Portola Valley Town Center	Siegel & Strain	3
12	2007	Government Canyon Visitor Center	Lake|Flato	3
13	2006	World Birding Center Headquarters *	Lake|Flato	3
14	2006	Solar Umbrella House *	Brooks + Scarpa	3
15	2014	ASU Student Health Services	Lake|Flato	2 (17%)
16	2013	Federal Center South Building 1202	ZGF	2
17	2013	Charles David Keeling Apartments	KieranTimberlake	2
18	2012	Iowa Utilities Board	BNIM	2
19	2011	Cherokee Studios	Brooks + Scarpa	2
20	2011	Step Up on 5th *	Brooks + Scarpa	2
21	2010	Pearl Brewery / Full Goods Market *	Lake|Flato	2
22	2009	Synergy at Dockside Green	Perkins+Will	2
23	2008	Yale Sculpture Building and Gallery	KieranTimberlake	2
24	2008	Pocono Environmental Education Center	Bohlin Cywinski Jackson	2
25	2007	Heifer International Headquarters *	Polk Stanley Wilcox	2
26	2007	Global Ecology Research Center	EHDD	2
27	2006	Ballard Public Library *	Bohlin Cywinski Jackson	2
28	2005	Lloyd Crossing Sustainability Plan *	Mithun	2
29	2004	Genzyme Center	Behnisch	2
30	2000	CK Choi Building	Matasuzaki	2

*Projects that also have won an AIA Institute Honor Award

two."[39]

The 13 projects that have won both Top Ten and Institute Honor Awards account for only 7% of all Top Ten winners, which could indicate that architects in general are struggling to bring together "design excellence" and sustainable performance, as other surveys have suggested.[40] However, all but one of the 13 have occurred in the past decade, with seven in the past half dozen years, implying that the two standards could be progressively aligning.

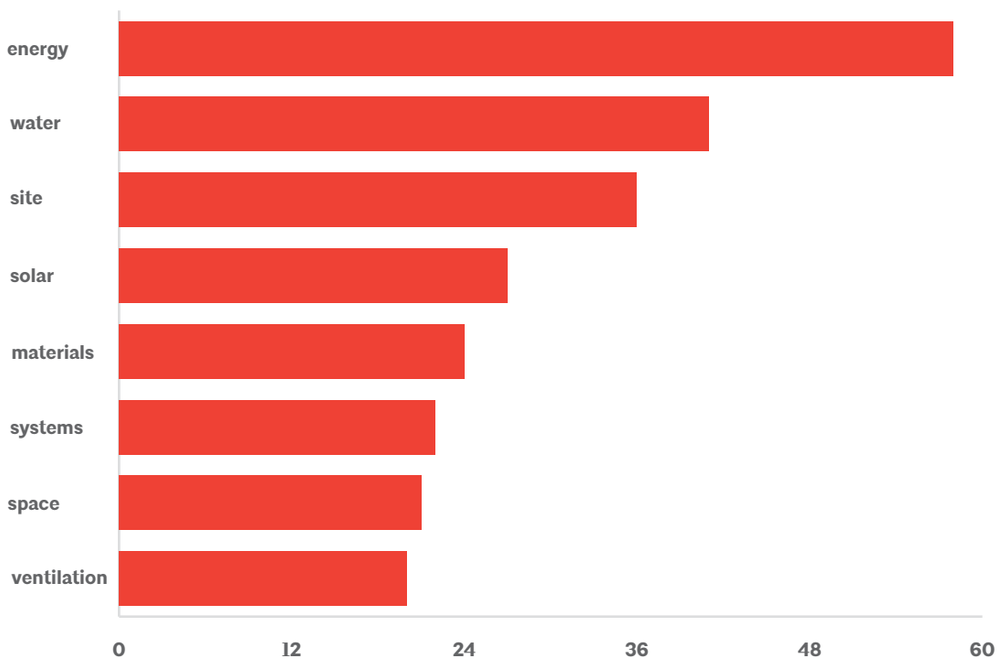
Nevertheless, does winning both a Top Ten Award and an Institute Honor Award necessarily demonstrate "the integration of sustainable performance and design excellence"? The Institute Honor Awards jury comments for the 13 projects that have won both awards are roughly evenly divided: seven mentioned some aspect of sustainability or performance as a measure of success, and six did not. Former COTE Chair Bill Leddy, who has won both awards multiple times (for different projects), observes, "Achieving fully integrated design excellence is a more difficult accomplishment than simply making a beautiful building."[41] A project can perform well and look good for very different reasons, while an integrative approach uses design strategies to achieve both.

A good example is Bohlin Cywinski Jackson's Ballard Library and Neighborhood Center, which won both a Top Ten and an Institute Honor Award in 2006 (see cover photo). The basic design gestures—an enormous green roof canopy tilting southward, eroded massing on the west face, deep overhangs, strategically placed louvers, and extensive transparency on the north—contribute significantly to both the architectural character and the

39 Correspondence with the author, January 11, 2016
40 Hosey, "The G List," 2010
41 Correspondence with the author, January 25, 2016

Measure 1: Design & Innovation

FIGURE 16 **Most frequently used words in Measure 1 narratives for the 30 exemplars**



performance of the project, achieving a high degree of integration between the two.

For this report, a dozen past Top Ten judges were invited to identify past winners they feel are especially compelling examples of merging good design and good performance. (See Acknowledgements for the Measure 1 Committee.) As with Top Ten juries, the participants were asked to use their own judgment and allowed up to ten choices, but they could not choose projects produced by their own organizations. Twelve committee members chose 58 projects that one or more participants felt exemplified Measure 1, and 30 projects received two or more votes. All but two of the 13 Institute Honor Award winners were chosen by at least one committee member.

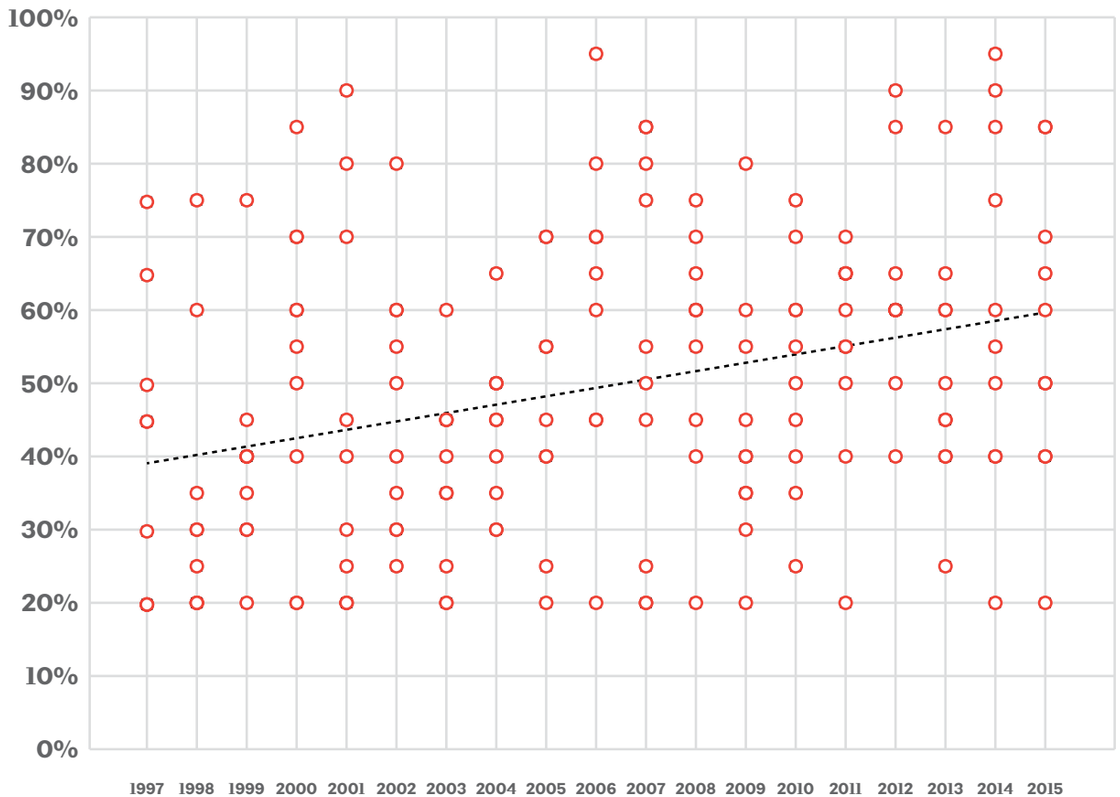
Out of all 189 Top Ten winners, only one was chosen by a majority (58%) of the committee: EHDD's David and Lucile Packard Foundation Headquarters (2014 winner). "Our designs begin with solving the problem at hand, and that's the starting point for any aesthetic considerations," says Marc L'Italien, FAIA, EHDD's design principal for Packard. "A formal expression that thwarts the client mission or compromises building performance is not pursued. Obviously, the outcome is wildly unpredictable, which is why our work has no stylistic signature. This is ultimately what makes it interesting for us and why people like to work here."[42]

Analysis of the Measure 1 narratives for the 30 exemplars reveals common themes. After removing general terms such as "design," "building," and "sustainability," the most frequently used word by far is "energy," with 58 instances, suggesting that these architects heavily focused on improving energy performance through design. For example, the Measure 1 narrative for The Bullitt Center (2015 winner) states, "Virtually every design decision made by the

42 Correspondence with author, January 29, 2016

Measure 1: Design & Innovation

FIGURE 17 **Degree of "integration of sustainable performance and design excellence," Top Ten winners, 1997-2015:**



integrated design team supported the building's aggressive net-zero energy target...." "Water" (41) and "site" (36) are similar in frequency, with other terms following thereafter.

Of the 30 projects receiving more than one vote, only two were built before 2005. All of the 14 with more than two votes were built in the past decade, with eight (60%) in the past five years, once again suggesting that designers could be getting better at integrating sustainability and design excellence.

To test this impression, the research team reviewed all 189 projects to estimate whether integration is becoming more apparent over time. Using our own judgement, we individually assigned each project a score indicating the degree to which the project exemplifies the intent of Measure 1. We aggregated our scores for each project, with 100% representing the group's consensus that a project was fully successful. For example, the team gave the Ballard Library and the Packard Foundation Headquarters each a score of 95%. Using this method to score all Top Ten winners since 1997 shows an upward trend of about 20%, suggesting that the industry is becoming more adept at pursuing COTE's mission, with a majority of Top Ten winners now appearing to merge design and sustainability well.

Other research supports the finding that Top Ten winners exemplify the integration of design and performance. In 2012, the architect ml Robles and her colleagues at the University of Colorado published a two-year study of 20 buildings, half of them LEED Platinum buildings that also have won Top Ten Awards and half of them LEED Platinum buildings that have not. Their goal was to find ways of "measuring the performance of spaces that make us feel fully alive and that inspire us, creating wellbeing. Did those spaces have particular attributes that inform their building performance?" They reviewed each project for passive design strategies that influence occupant

Measure 1: Design & Innovation

experience, including daylight, connection to the outdoors, thermal comfort, materiality, and responses to context and to seasonal cycles. They found that 80% of the Top Ten projects had these qualities, while approximately 30% of the others did.[43]

Robles and her colleagues also conducted an online poll in which respondents were shown photographs of Top Ten winners and asked to rank them around the question, "Do you think this building is beautiful?" The results showed that buildings considered to be most attractive by the general public also exhibit those qualities the researchers associated with promoting well-being. Finally, the study concluded that Top Ten projects are twice as likely to employ unique strategies that go beyond industry best practices. In other words, Top Ten winners are leading examples of sustainable design innovation.

43 Robles, Zhai, and Goodrum, "Beauty in Building," 2012

Measure 2: Regional/ Community

SERA, Cutler Anderson Architects
Edith Green Wendell Wyatt Federal Building Modernization

PORTLAND, OR
2014 WINNER

The design process led to a decision to renovate the existing building instead of erecting a new building in the suburbs, resulting in 1,200 Federal workers not relying on automobiles for transportation.

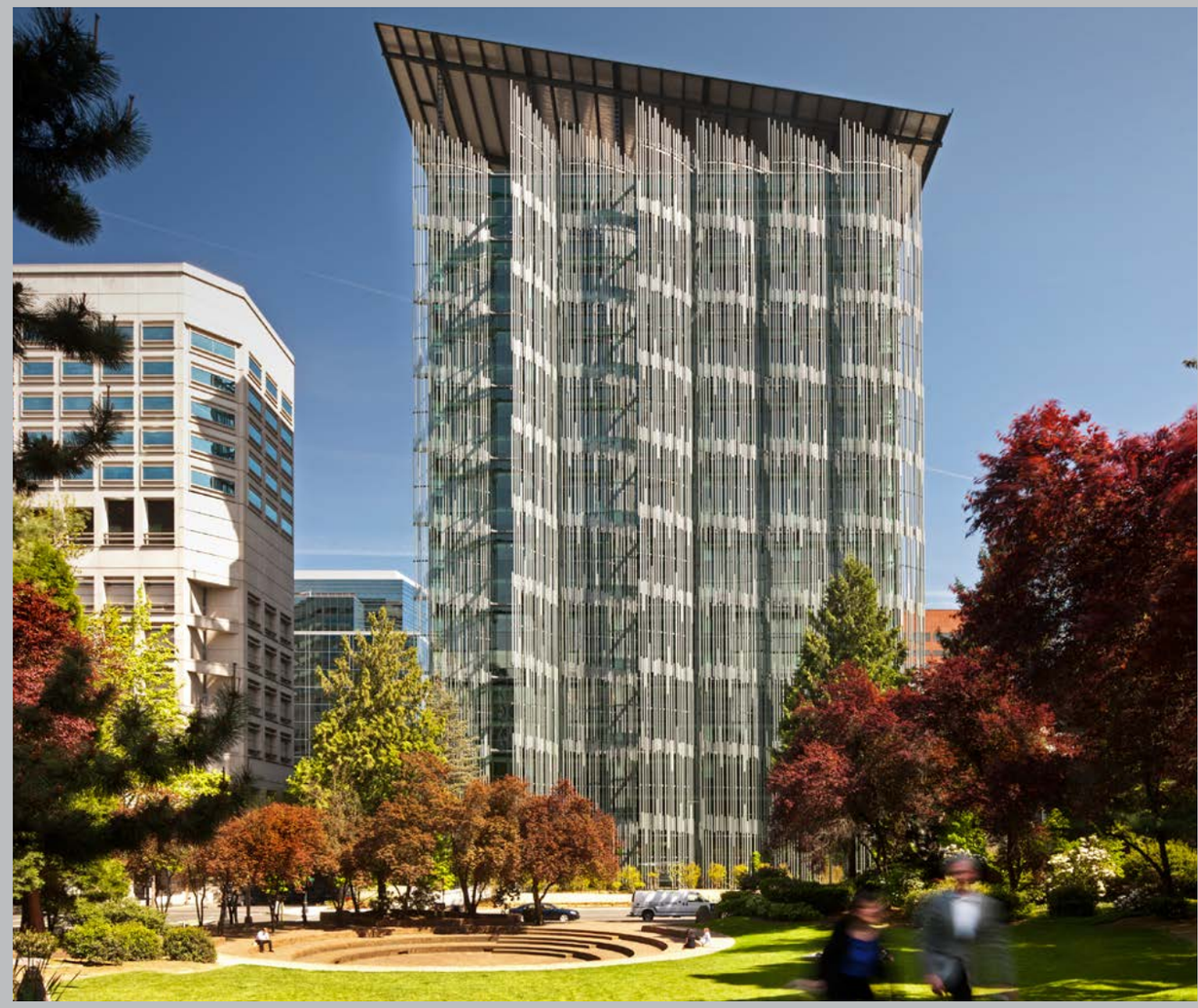


Photo: Nic Lehoux

Measure 2:
Regional/Community Design

FIGURE 18 Percent of Top Ten winner building occupants using alternative transportation, 2007-2015

"Sustainability is integrally tied to the social, political, cultural and economic health of our communities. Describe how these issues have informed the sustainable elements of this project and how this project has contributed to the richness and resilience of its community."

2016 CALL FOR ENTRIES

This measure asks architects to explain "how the design promotes regional and community connectivity and sense of place, public space and community interaction," including site selection and strategies to reduce reliance on cars. According to the Green Building Information Gateway (GBIG), for Top Ten projects the average Walkscore, a measure of a location's walkability and diversity of uses, is 66/100, fairly average.[44] Since 2007, entries have been required to estimate how many of a project's users take advantage of alternative transportation: "indicate the percentage of the building population traveling to the site by public transit (bus, subway, light-rail or train), carpool, bicycle or on foot." Analysis of winners since that year shows a steady rise of nearly 10% in the median percentage of building occupants accessing these means of travel. This trend suggests a growing sensitivity to connecting buildings to their communities.

44 See GBIG and Walkscore.com

Measure 3:
Land Use & Site Ecology

Aidlin Darling, 355 11th Street: The Matarozzi/Pelsinger Multi-Use Building

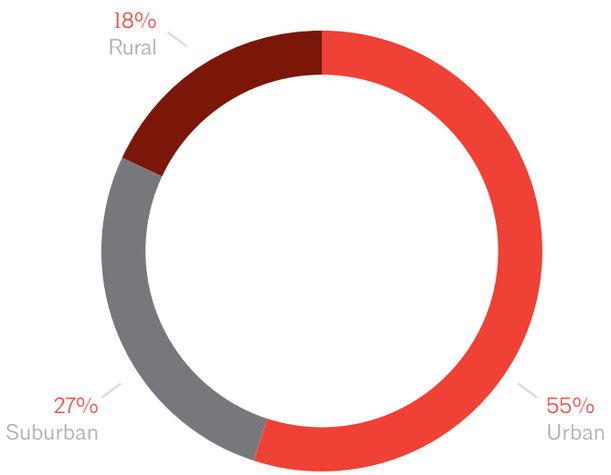
SAN FRANCISCO, CA

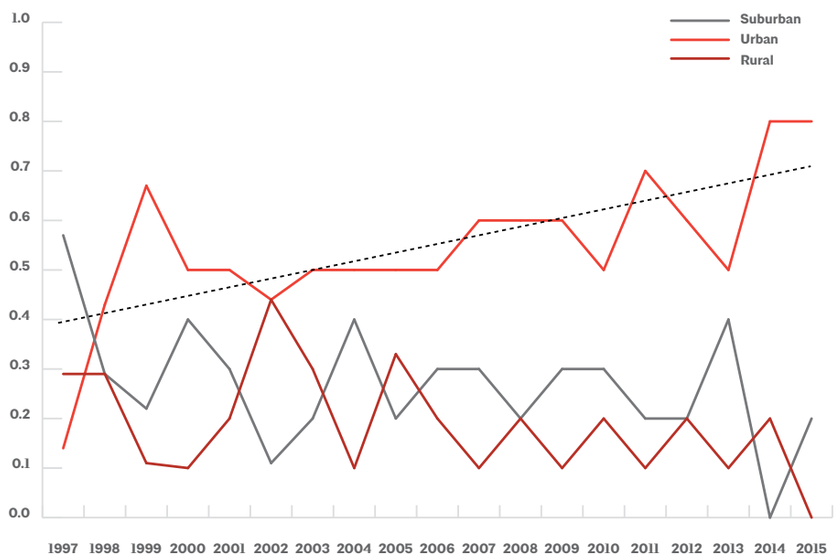
The first Top Ten Plus winner (2013) exemplifies compelling performance for adaptive reuse in a dense urban setting.

Photo: Nic Lehoux

Measure 3:
Land Use & Site Ecology

FIGURE 19 **Context of Top Ten projects, 1997-2015**





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

2016 CALL FOR ENTRIES

Much of what submitting teams include for this category has focused on rainwater management and therefore overlaps with Measure 6: Water Cycle. However, one specific question asked for Measure 3 is "how the design responds to local development density (rural to urban) or conditions (brownfield to greenfield)." A common perception is that Top Ten and perhaps green building in general have heavily emphasized projects in pastoral greenfield settings—"learning centers, rural scout camps, and environmental discovery centers," as Bob Berkebile put it in 2008.[45] In fact, the majority (55%) of AIA COTE Top Ten winners have been urban, while only 18% have been rural. Over time, the number of urban projects has increased dramatically, while rural projects have declined. Furthermore, 79% of all Top Ten winners are built on previously developed land, and 41% of these have been historic or brownfield sites. This trend could indicate that sustainable practices are increasingly becoming integral to denser communities, promoting land conservation, public health, and social connectivity all at once. "We are in a transitional moment," remarked the 2013 jury, which selected the first Top Ten Plus award. "We are moving from a time when it was absolutely necessary to get people out of their daily life and to take them to a beautiful, natural place that was secluded and teach them about a subject that was new to them [sustainability]. Now we are seeing buildings compel people to change their culture by being part of that culture."[46]

45 Quoted in Sokol, 2008

46 2013 Top Ten jury comments. (The author served on this jury.) aiatopten.org/node/241

Measure 4: Bioclimatic Design

Eskew+Dumez+Ripple,
New Orleans Bioinnovation Center

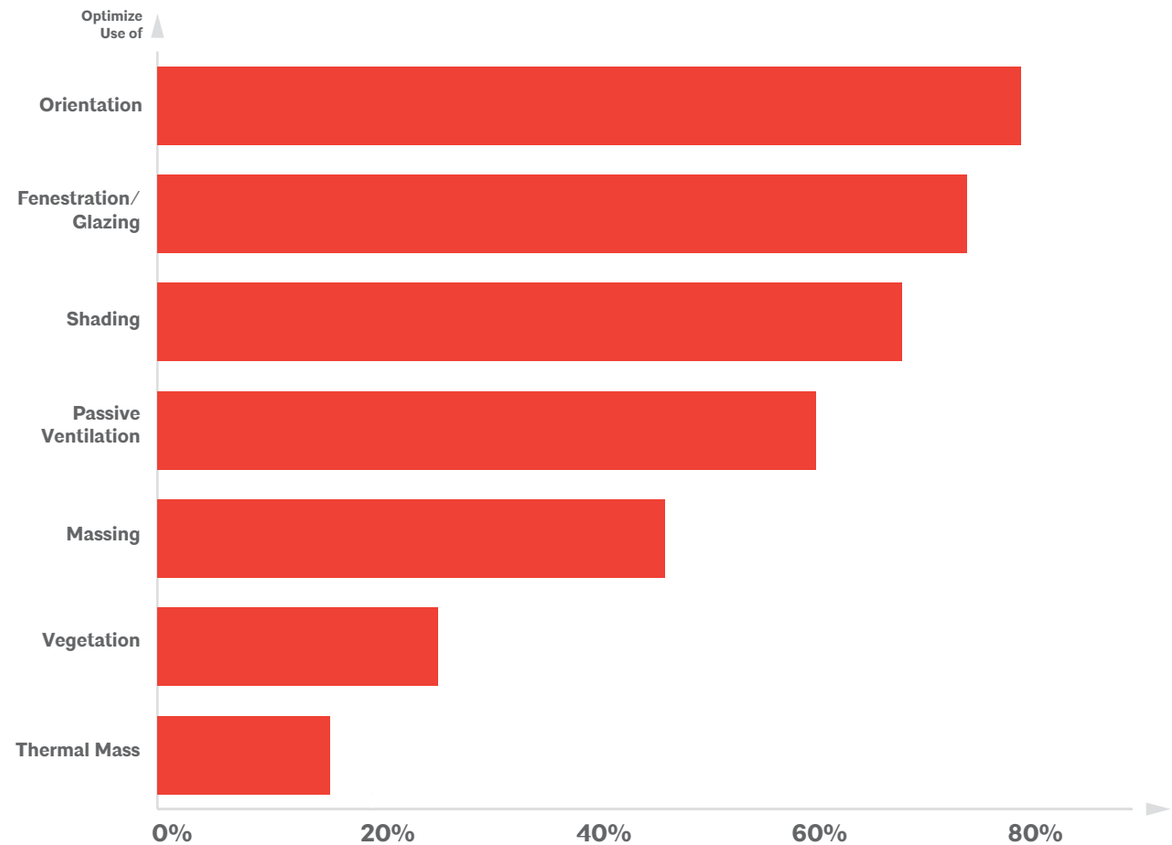
NEW ORLEANS
2015 WINNER

The building form is configured to provide a protected courtyard, following French Quarter precedents. Louvers allow the southwest-facing Canal Street façade to be 63% glass, while the summer solar heat gain is the equivalent of a building with 18% glazing.

Photo: Timothy Hursley

Measure 4: Bioclimatic Design

FIGURE 20 Most common bioclimatic design strategies in Top Ten winners, 2006-2015



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

2016 CALL FOR ENTRIES

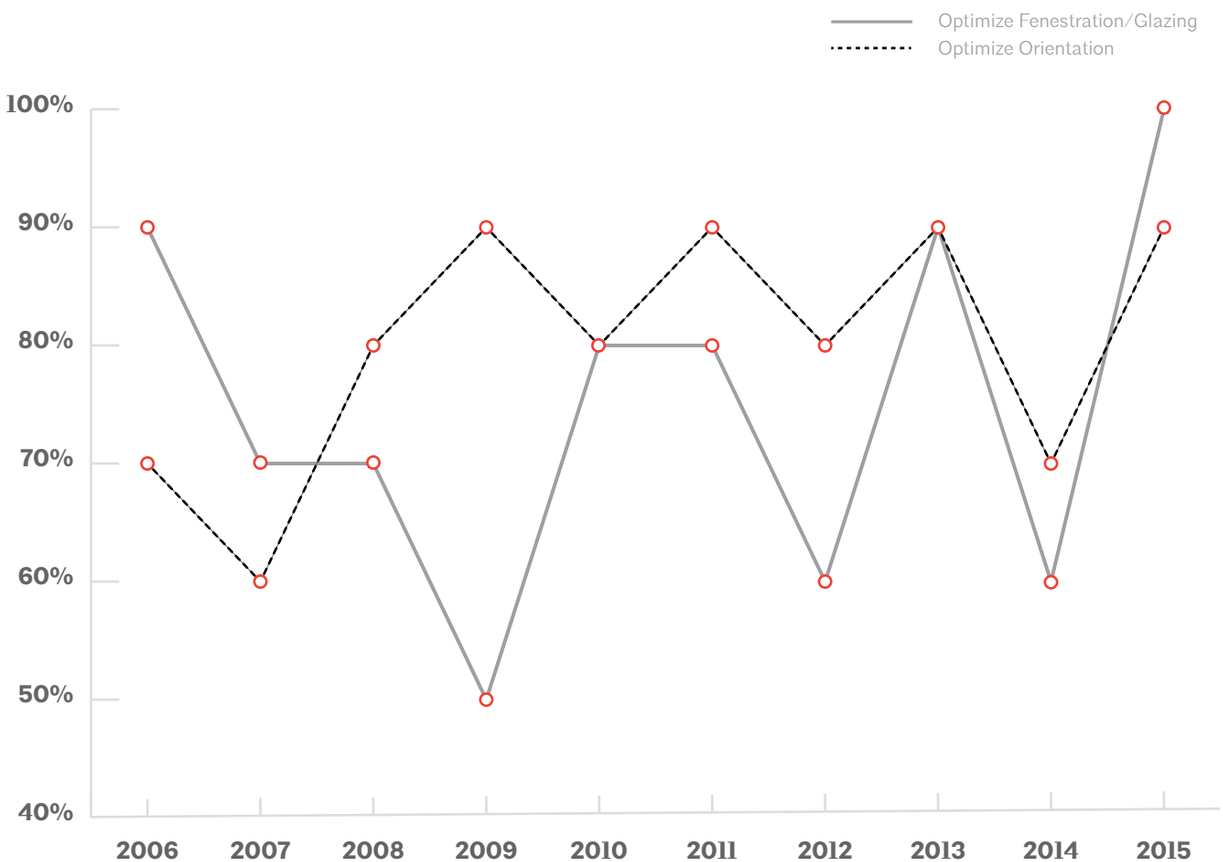
The narrative requests that designers "describe how the building responds to local climate, sun path, prevailing breezes, and seasonal and daily cycles through passive design strategies," emphasizing "how these strategies specifically shaped the building plan, section, and massing" and "how these strategies specifically affected placement, orientation, and shading of the building." No metrics are requested for this measure, but the researchers looked closely at the 100 winning projects over the past decade and identified the seven most common strategies listed under Measure 4. The three most popular—used by over two thirds of projects—are: (1) orienting the building to coordinate with the sun and wind; (2) strategic sizing and placement of windows and glazing; and (3) shading devices to control solar heat gain. All of these strategies directly affect the appearance of buildings, so they relate closely to Measure 1 and COTE's aim to integrate design and sustainability.

Furthermore, use of the most common strategies—orientation and fenestration/glazing—appears to be increasing in frequency. Averaging their use in the annual winners shows an upward trend of 10-20% over the past decade. Jury member Peter Rumsey observed this trend in 2015: "The façades are becoming much more responsive to climate."[47] This conclusion is consistent with Robles' 2012 research, which found that, compared to LEED Platinum buildings celebrated for performance, not design, a Top Ten winner is four times more likely to "take its shape from the particular place in which it occurs."[48]

47 Quoted in Madsen and O'Malley, 2015
48 Robles, Zhai, and Goodrum, "Beauty in Building," 2012

Measure 4: Bioclimatic Design

FIGURE 21 Average use of two most common bioclimatic design strategies in Top Ten winners, 2006-2015



Measure 5: Light & Air

Perkins + Will,
1315 Peachtree Street

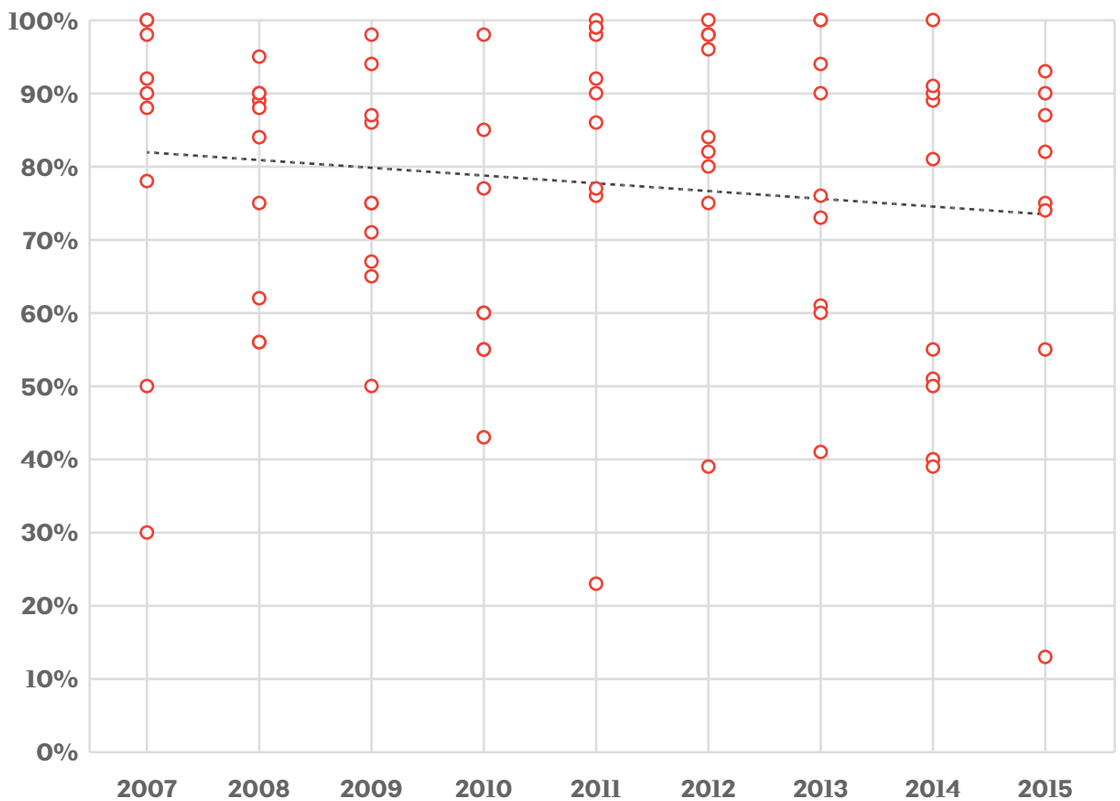
ATLANTA, GA
2012 WINNER

Open space and floor-to-ceiling glazing offer outdoor views in 98% of spaces and daylight autonomy in 84%.

Photo: Eduard Hueber

Measure 5: Light & Air

FIGURE 22 Daylight autonomy in Top Ten winners, 2007-2015



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

2016 CALL FOR ENTRIES

This measure asks submitters to provide details on "how the project's design enhances connections between indoors and outdoors," specifically by providing the amount of natural light, views of the outdoors, and access to outdoor fresh air through operable windows. Whether teams submit predicted or actual information is not clear in the information reported, but presumably many, if not most, projects rely on estimates modeled during design, not actual measurements after post-occupancy. Currently, submitters are asked to provide the following:

Percent of regularly occupied spaces with/within:

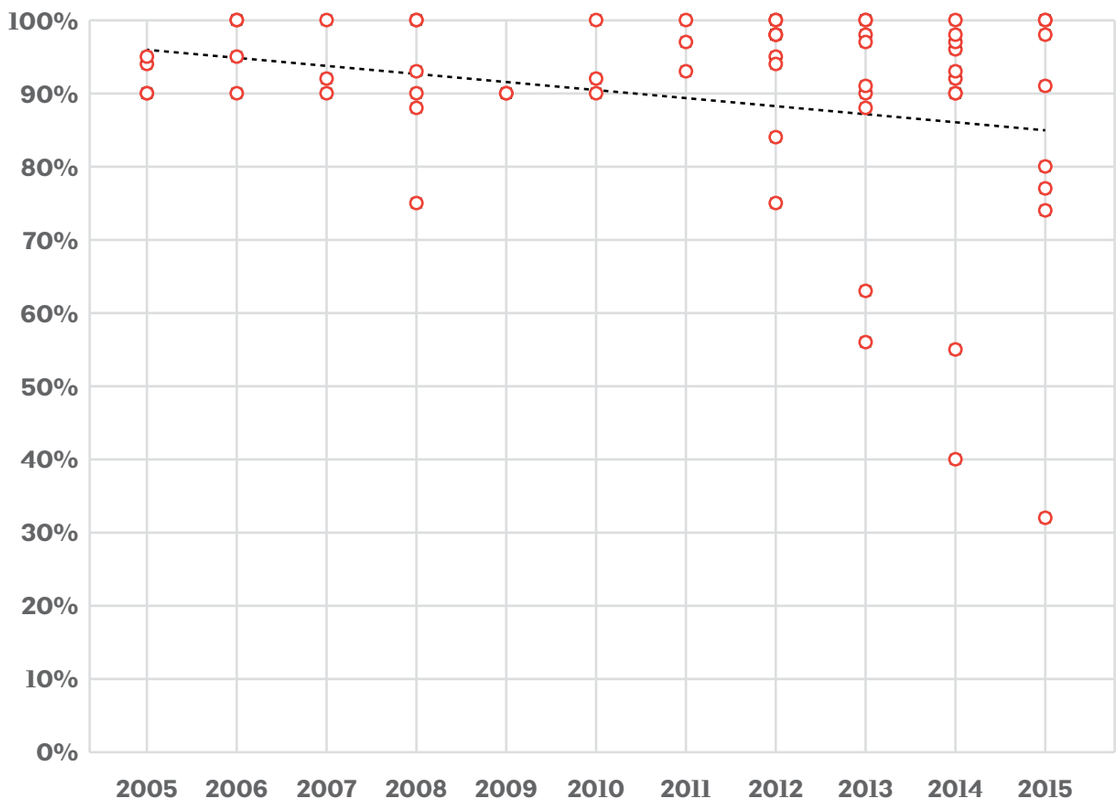
- daylight autonomy (levels allowing lights to be off during daylight hours)
- views to the outdoors
- 15 feet of an operable window

Some of this information has been requested only in the past several years, so the available data is spotty. Prior to 2007, only 30% of projects submitted information for daylight; since then, 93% have. For all Top Ten winners, the average percentage of spaces with daylight autonomy is 81%, six points higher than the threshold target in LEED (75%).[49] The general trend since 2007 shows a slight decline of approximately 8%, which coincides

[49] LEED for New Construction v3 (2009) daylight credit EQc8.1 awards one point for 75% of regularly occupied spaces achieving daylight autonomy.

Measure 5: Light & Air

FIGURE 23 Views to the outdoors in Top Ten winners, 2005-2015



with a rise in the diversity and complexity of building types. For example, the three projects with daylight autonomy lower than 40% are a large hospital, a large convention center, and a large federal courthouse, all buildings with complicated programs that often do not require or easily accommodate natural light.

Accordingly, the percentage of spaces with views of the outdoors also trends downward slightly. However, only slightly more than half of projects from this period submitted information for views, so the data is not reliable. Since 1997, projects reporting this information have an average of 91% of spaces with views, on par with the LEED threshold (90%).[50]

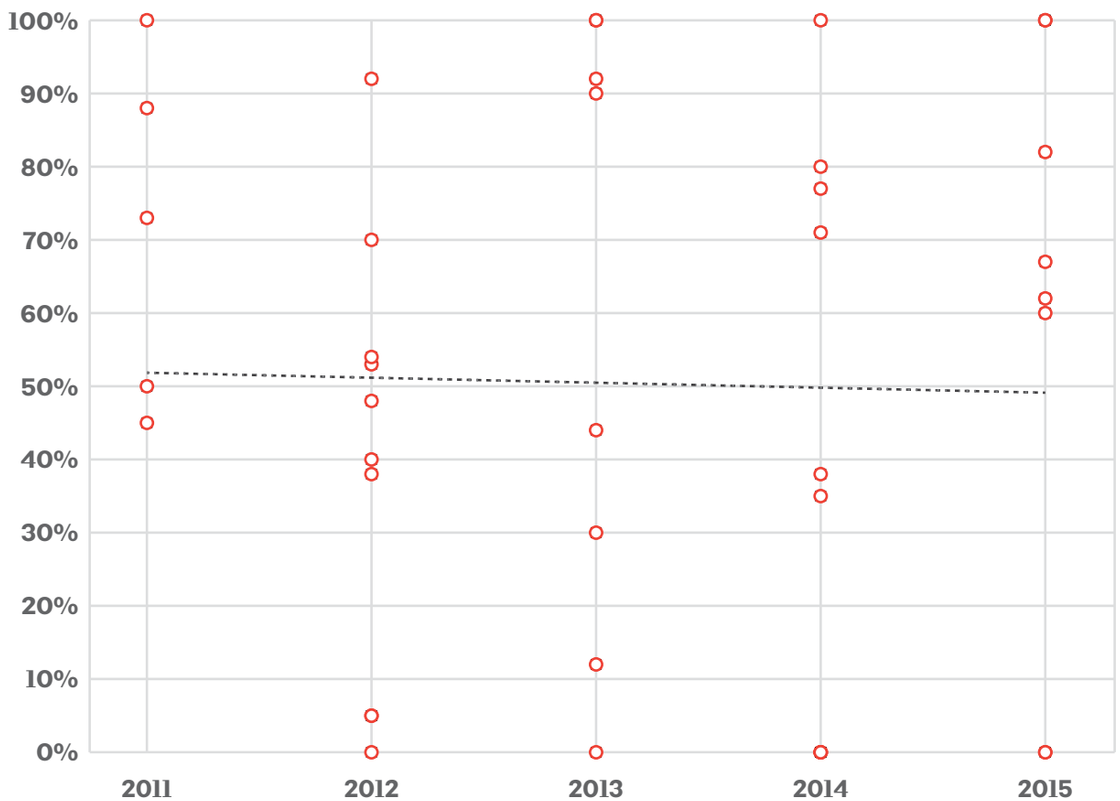
Information for operable windows is mostly unavailable prior to 2011, and the trend since then has held fairly steady. The past decade appears to have seen relatively little progress with natural light and ventilation in larger, more complex buildings. Nevertheless, for all Top Ten winners since 1997, the average percentage of spaces near operable windows is 58%, exceeding the equivalent LEED threshold (50%).[51]

[50] LEED for New Construction v3 (2009) views credit EQc8.2 awards one point for 90% of regularly occupied spaces offering "a direct line of sight to the outdoor environment via vision glazing" 30-90 inches above the floor.

[51] LEED for New Construction v3 (2009) thermal comfort control credit Eqc6.2 awards one point for 50% of regularly occupied spaces offering individual comfort controls or operable windows.

Measure 5: Light & Air

FIGURE 24 Spaces with operable windows in Top Ten winners, 2011-2015



Measure 6: Water Cycle

BNIM, Omega Center for Sustainable Living

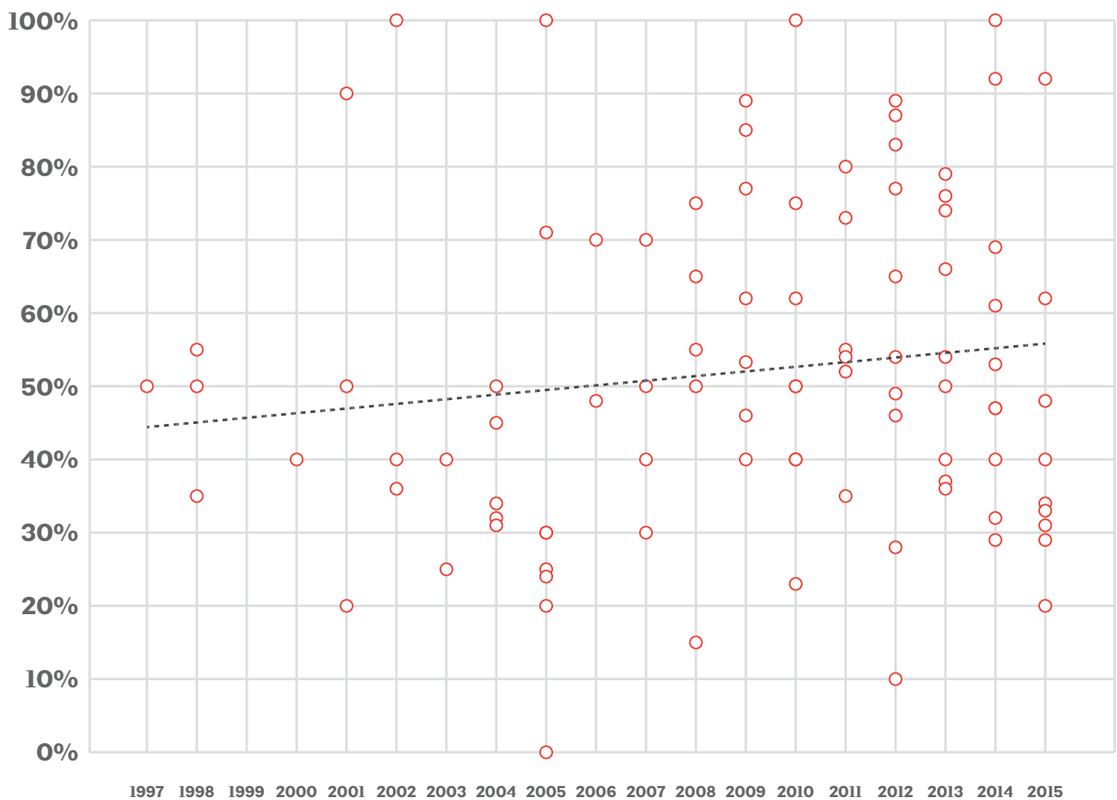
RHINEBECK, NY
2010 WINNER

An “Eco Machine” uses plants and natural bacteria to make 100% of black and gray water cleaner at the end of the cycle than it is at the beginning.

Photo: Assassi

Measure 6: Water Cycle

FIGURE 25 Potable water reduction in Top Ten winners, 1997-2015



"Sustainable design conserves water and protects and improves water quality."

2016 CALL FOR ENTRIES

This category considers two primary metrics—reduction of potable water below a baseline standard, and volume of rainwater managed on site. Half (51%) of all submissions since 1997 have provided the former, and the average potable water reduction for those 96 projects is 52% below the baseline standard, much higher than the 20-40% range required or credited by LEED.[52]

From 1997 to 2015, water efficiency has trended upward about 10%. In the first five years (1997-2001), the average efficiency was 41%, with 36% of projects reporting. In the past five years (2011-2015), the average has been 55%, with 88% of projects reporting, so water reduction has improved over a much larger sample of projects.

As reported in their submissions, five projects have achieved 100% reduction in potable water use:

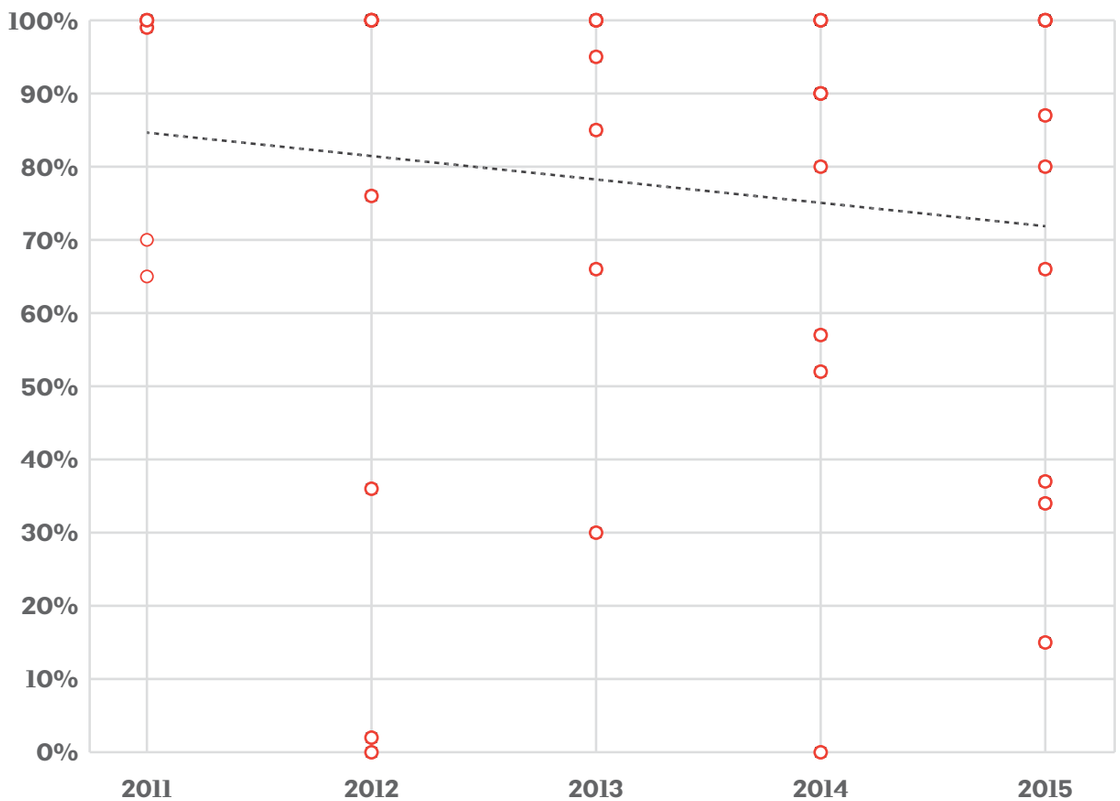
2014 Sustainability Treehouse (Mithun / BNIM)
2014 US Land Port of Entry (Snow Kreilich)
2010 Omega Center for Sustainable Living (BNIM)
2005 Leslie Shao-Ming Sun Field Station (Rob Wellington Quigley)
2002 Tofte Cabin (Sarah Nettleton)

The rainwater metric for Measure 6 is the percentage from a maximum anticipated 24-hour, 2-year storm event that can be managed on site. From 1997 to 2010, only 22 projects (16%)

52 LEED for New Construction v3 (2009) credit WEc3 awards up to four points for up to 40% reduction in potable water use.

Measure 6: Water Cycle

FIGURE 26 Rainwater managed on site in Top Ten winners, 1997-2015



reported any data on rainwater management. Since 2011, 92% of projects have submitted this information. During this latter period, rainwater management has trended slightly downward, possibly due to a spike in the number of projects in dense urban areas, where managing stormwater can be more challenging because of site constraints. (See Measure 3: Land Use and Site Ecology.) Regardless, the average percentage managed on site is 80% for all Top Ten winners and 78% since 2011, so the number is holding steady overall.

Measure 7: Energy Flows & Energy Future

WRNS,
Watsonville Water Resource Center

WATSONSVILLE, CA
2010 WINNER

According to the New Buildings Institute, on-site energy production more than doubles what the building needs to operate.

Photo: Bruce Damonte

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."

2016 CALL FOR ENTRIES

Over the past decade, AIA and COTE have progressively raised the bar for energy performance. In 2005, the AIA adopted the 2030 Challenge, which seeks a series of successive targets toward carbon neutrality by that year, and in 2009 it launched the AIA 2030 Commitment to give architects a framework for reporting their projects. In 2015, the AIA COTE Top Ten call for entries began emphasizing the importance of meeting 2030 targets: "In acknowledgement of the increasingly important role architects must play in helping to address the challenges of climate change, and in keeping with the Institute's core values surrounding this issue, submissions are expected to make every effort to comply with the goals of the AIA 2030 Commitment." The same year, the Top Ten program began requiring that submitting firms have signed the 2030 Commitment: "Submissions failing to provide proof of this commitment will be disqualified."

While energy performance has been a constant criterion for Top Ten since the beginning, the specific metrics have changed markedly over the years. Early on, relatively little information was required, while the current forms include eight metrics and an energy model summary. Over the years, two metrics have remained fairly consistent:

- Predicted energy use intensity (pEUI) in kBtu/sf/yr
- Percent savings from baseline

Measure 7:
Energy Flows & Energy Future

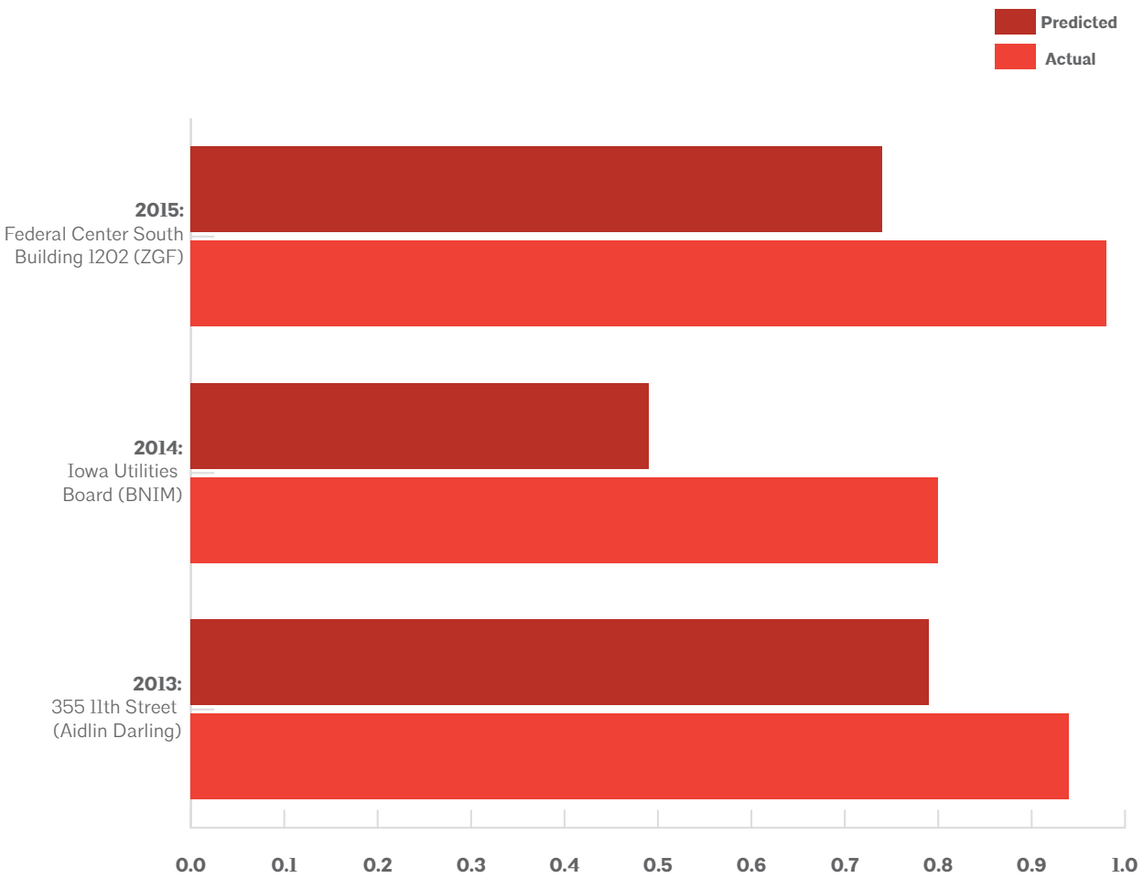
Of the two, EUI varies widely between different project types, so for the purposes of the report the researchers have focused on the second metric, percent savings from a baseline. However, the baseline reference changed circa 2010. Prior to that year, the reduction was based on energy cost, which is how LEED calculates energy savings, and since then the reduction has been benchmarked against the national average EUI for the building type. The first was measured against "a minimally code compliant base model," using ASHRAE 90.1, "or the local code/ standard, whichever is more stringent." ASHRAE 90.1 is regularly updated, so it has been a moving target in itself, and the provision to choose a local code meant that projects submitted from different jurisdictions could not easily be compared. Since 2010, energy reduction has been calculated by using the EPA's Target Finder to find the national average in the Commercial Buildings Energy Consumption Survey (CBECS). The change was due to the launch of the AIA 2030 Commitment, which uses CBECS as the baseline. Firms began reporting to the 2030 Commitment in 2010, so COTE changed the Top Ten baseline accordingly.

The differences between the baselines can be substantial. For example, a recent project submitted showed a 47% energy cost reduction from the LEED baseline and a 37% reduction using CBECS. Comparing Top Ten winners' energy reductions over time is only reliable within a rather wide margin of error. Nevertheless, the comparison is a useful indication of how energy performance has progressed generally.

For the 189 entries since 1997, 56% have provided a percentage for energy reduction, although the volume is improving. In the first five years (1997-2001), 30% submitted this information, while in the past five years (2011-2015), 86% did. Two thirds have provided EUI since 1997, so there are considerable gaps in all the available energy data.

Measure 7: Energy Flows & Energy Future

FIGURE 27 Energy savings in "Top Ten Plus" Winners, 2013-2015



The average energy reduction for all Top Ten winners that have provided this information is 54%, slightly exceeding the upper limit (50%) of energy credits in LEED.[53] Similarly, a 2009 COTE-sponsored study of energy performance in Top Ten winners found that 91% of a small sample of projects that could be compared to a national average performed better than average.[54]

Charting energy performance since 1997 shows a significant upward trend. In recent years, the average has hovered around 65%, compared to 35-40% in the first decade, a sizeable improvement, especially given that the standards have become more aggressive, as well. Consistently over the past six years—and in some previous years—the annual average for energy performance of Top Ten winners has exceeded 2030 targets. (In 2015, 70% became the target, but projects awarded that year were completed earlier.) The cumulative average for that period (2010-2015) is 64% reduction, compared to a 50-60% target for 2030 during those years. The annual averages also are significantly higher—nearly double in some years—than the annual averages for all projects reported to the 2030 Commitment, according to the AIA.[55] For example, the 2014 average for Top Ten was 67%, compared to 36.9% for all projects reporting to 2030—a 30-point difference.

All of these numbers are based on predicted performance, not actual, and intention and outcome can vary widely. A 2008 study by the New Buildings Institute (NBI) examined actual energy performance (measured post-occupancy) for 121 LEED-certified buildings and found that 25% achieved higher than expected

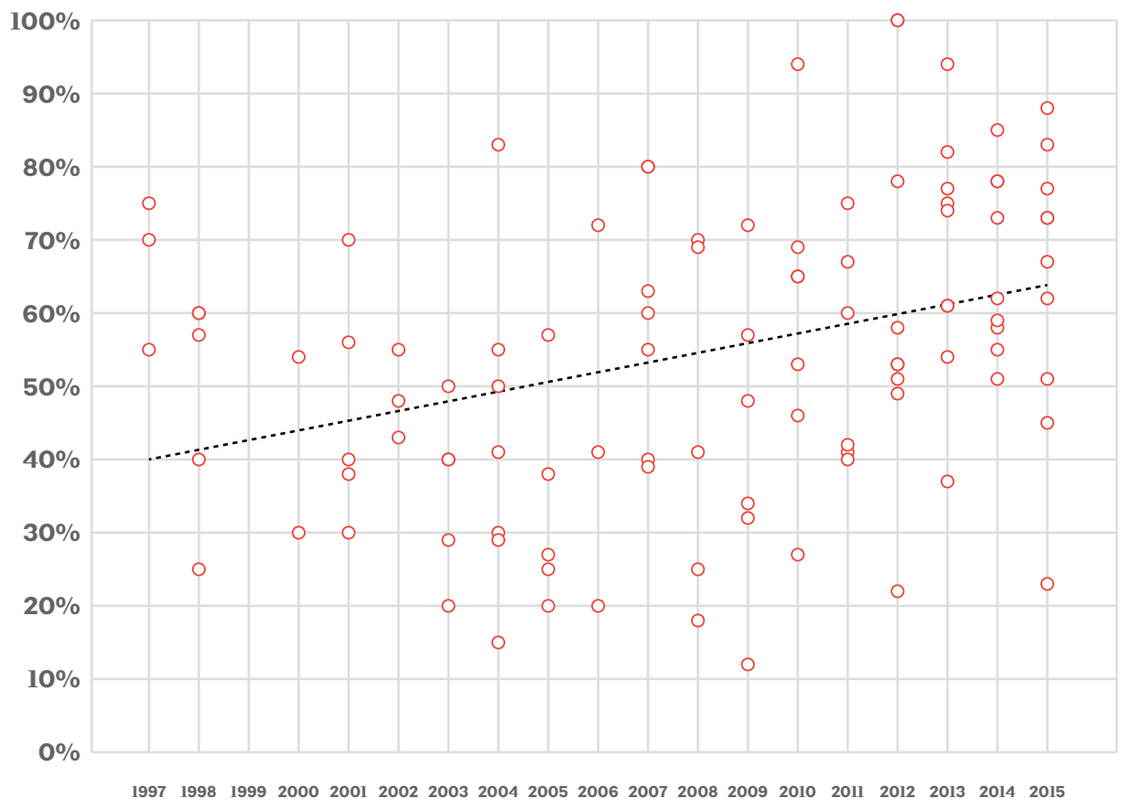
53 LEED for New Construction v3 (2009) EA1 "Optimize Energy Performance" awards points for 6% to 50% reduction from a baseline.

54 Brown, "Performance by Design," 2009

55 "AIA 2030 Commitment 2014 Progress Report," 2015

Measure 7: Energy Flows & Energy Future

FIGURE 28 **Energy Performance in Top Ten Winners, 1997-2015**
% reduction from national median EUI for building type



outcomes, while 21% fell below the code baseline.[56] In the aforementioned 2009 COTE-sponsored study, the researcher collected actual energy performance data for 28 Top Ten winners and discovered that about a third used "significantly more energy than predicted."[57]

Beginning in 2016, actual energy performance information is being requested in the submission forms for all Top Ten entries. COTE believes that collecting more of this information will paint a clearer picture of how outcome aligns with intent. In the meantime, for each year since 2013 the "Top Ten Plus" program has awarded a past winner with exemplary post-occupancy performance. With the very limited group of three winners, actual energy performance has been dramatically better (15-31%) than expected.

Additionally, for the state of California, the NBI tracks "Ultra-low Energy Verified" buildings, which have a year or more of metered data documenting energy performance 60-80% better than the national industry average.[58] The most recent list (October, 2015) includes one Top Ten winner: Brooks + Scarpa's Colorado Court Affordable Housing (2003 winner). NBI lists the project's net EUI as 36.4, 7% better than the pEUI listed in the submission (39).

The research team also looked for net-zero energy (NZE) buildings among Top Ten winners. One challenge is that this term means different things to different people. It wasn't until 2015 that the Department of Energy released its "Common Definition of Zero Energy Buildings": "an energy-efficient building where, on a source energy basis, the actual annual

56 Turner and Frankel, 2008
57 Brown, ibid.
58 "California ZNE Watchlist"

Measure 7: Energy Flows & Energy Future

FIGURE 29 **2030 Challenge targets:**
% energy reduction from baseline

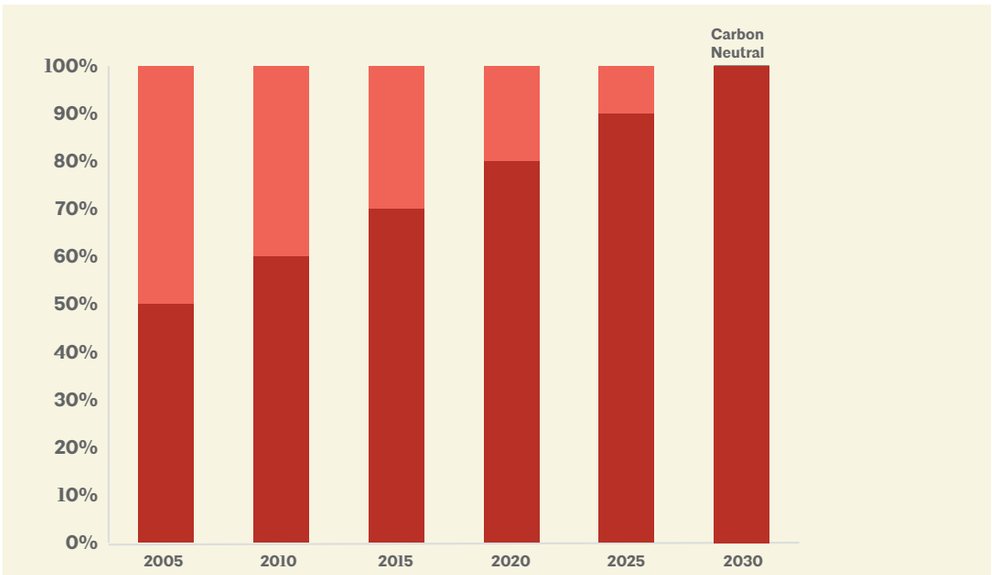


FIGURE 30 **Average annual reduction in Top Ten winners versus AIA 2030 Commitment, 2010-2015:**

YEAR	TOP TEN AVERAGE	AIA 2030 AVERAGE	DIFFERENCE
2015	64%	Data not available	
2014	67%	36.9%	30.1%
2013	68%	34.0%	34.0%
2012	63%	37.0%	26.0%
2011	54%	35.0%	19.0%
2010	65%	35.0%	30.0%

delivered energy is less than or equal to the on-site renewable exported energy."[59] Nine Top Ten winners have been verified by NBI as achieving net zero energy in this way.[60] These nine account for a fifth of all projects confirmed by NBI. One additional Top Ten project, the Wayne N. Aspinall Federal Building and U.S. Courthouse, is classified by NBI as "emerging," meaning it has yet to verify but is seeking NZE.

Verified "Net-Zero Energy" Top Ten Winners, 1997-2015:

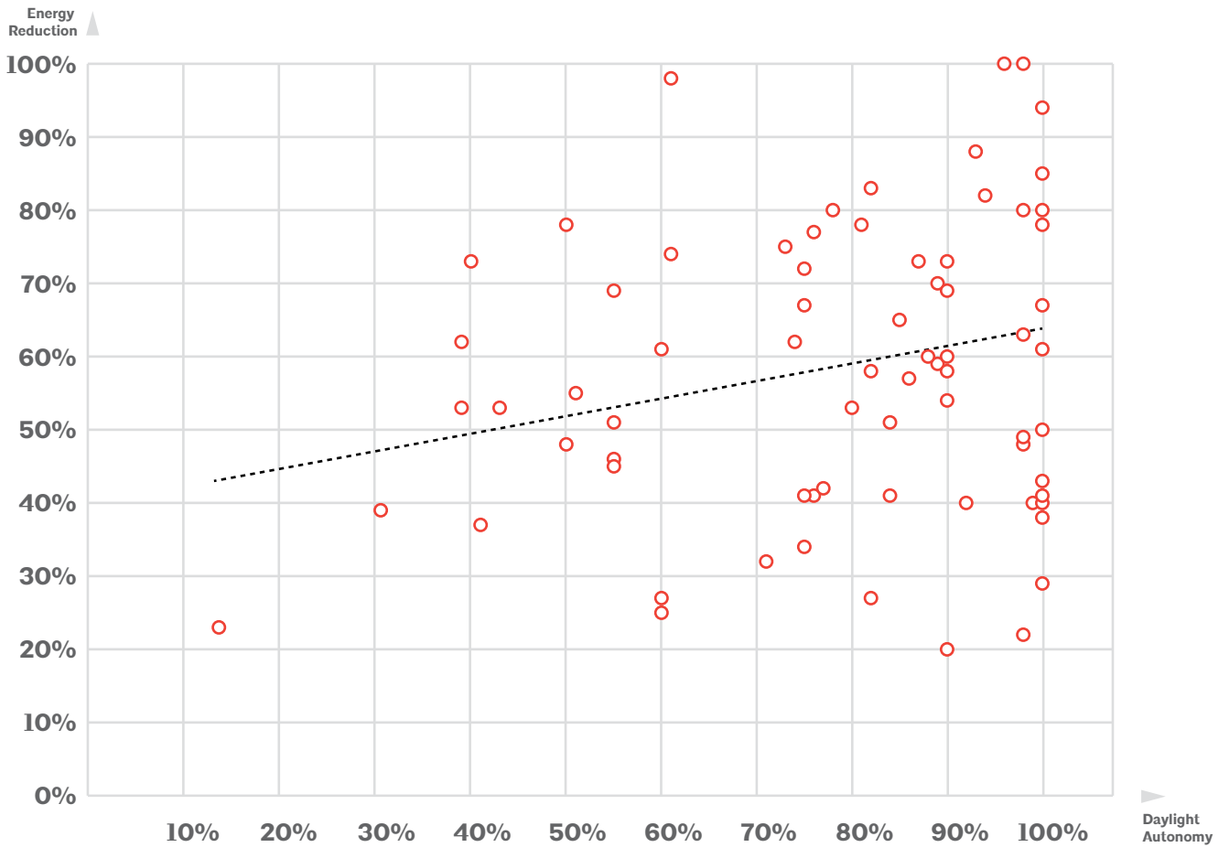
2015 The Bullitt Center, Seattle, WA (Miller Hull)
2014 David and Lucile Packard Foundation Headquarters, Los Altos, CA (EHDD)
2011 NREL Research Support Facility, Golden, CO (RNL)
2010 Omega Center for Sustainable Living, Rhinebeck, NY (BNIM)
2010 Watsonville Water Resource Center, Watsonville, CA (WRNS)
2008 Aldo Leopold Legacy Center, Baraboo, WI (Kubala Washatko)
2007 Hawaii Gateway Energy Center, Kailua-Kona, HI (Ferraro Choi)
2005 Leslie Shao-Ming Sun Field Station, Woodside, CA (Rob Wellington Quigley)
2002 Lewis Center for Environmental Studies, Oberlin, OH (William McDonough + Partners)

Finally, the research team studied energy performance in the 2012-2015 winners, compared to all submissions for that period (some 300+ projects). The average for the non-winning submissions actually was slightly higher (4-5%) than the average for winners. Energy performance alone does not

59 "A Common Definition for Zero Energy Buildings," 2015
60 "2015 List of Zero Energy Buildings"

Measure 7: Energy Flows & Energy Future

FIGURE 31 Daylight and Energy Reduction in Top Ten Winners, 1997-2015



guarantee a win and does not always demonstrate compelling sustainable design, which depends on a more holistic approach. For example, the researchers found a correlation between daylighting and energy performance. A 10% improvement in daylight autonomy appears to reduce energy consumption by 3–4% on average. This trend is yet another indicator of integrative design in Top Ten winners.

Measure 8: Materials And Construction

SOM, University Center—The New School

NEW YORK, NY
2015 WINNER

An advanced sensor system throughout the educational spaces increases ventilation rates automatically if VOC levels get too high.

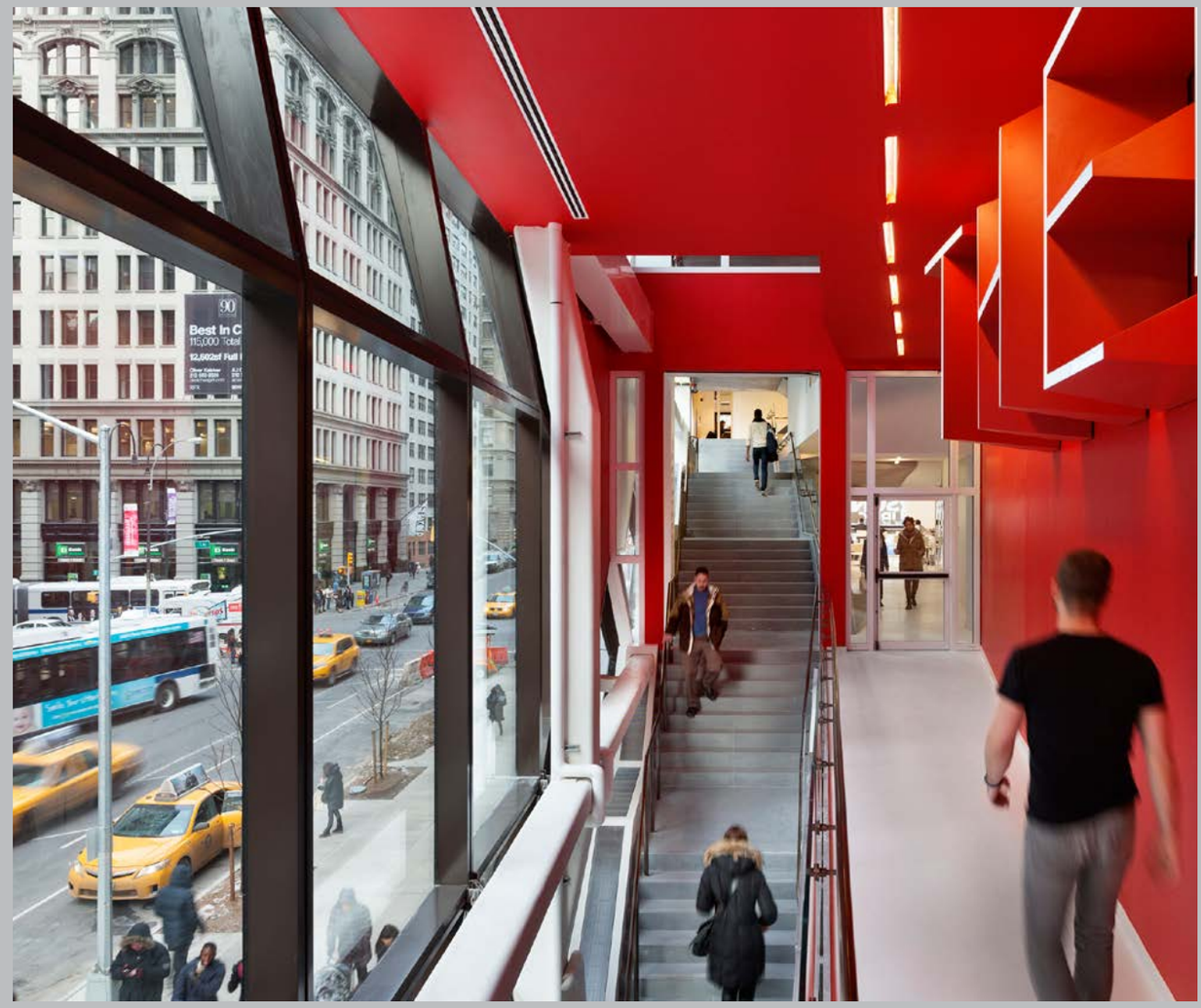


Photo: Nic Lehoux

Measure 8:
Materials And Construction

FIGURE 32 Materials metrics in Top Ten winners, 1997-2015

METRIC	AVAILABLE INFO*	TOP TEN AVERAGE	LEED THRESHOLDS**
Local materials	28%	36%	10-20%
Recycled content	21%	29%	10-20%
Waste diverted	40%	82%	50-75%

*Percentage of Top Ten winners that reported this information.

**Source: LEED for New Construction v3 (2009) Materials & Resources credits 2, 4, and 5.

FIGURE 33 Materials metrics in Top Ten winners, 2011-2015

METRIC	AVAILABLE INFO*	TOP TEN AVERAGE	LEED THRESHOLDS**
Local materials	44%	31%	10-20%
Recycled content	40%	25%	10-20%
Waste diverted	80%	83%	50-75%

*Refers to percentage of Top Ten winners that reported this information.

**Source: LEED for New Construction v3 (2009) Materials & Resources credits 2, 4, and 5.

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

2016 CALL FOR ENTRIES

In the narrative for this measure, submitters are asked to describe general material selection criteria, life cycle impact, construction waste reduction, and material efficiency. However, specific metrics are not required, and relatively few projects provided this information. From the narratives, the researchers collected three metrics: percentage of locally sourced materials (within 500 miles), percentage of recycled content in materials, and percentage of construction waste diverted.

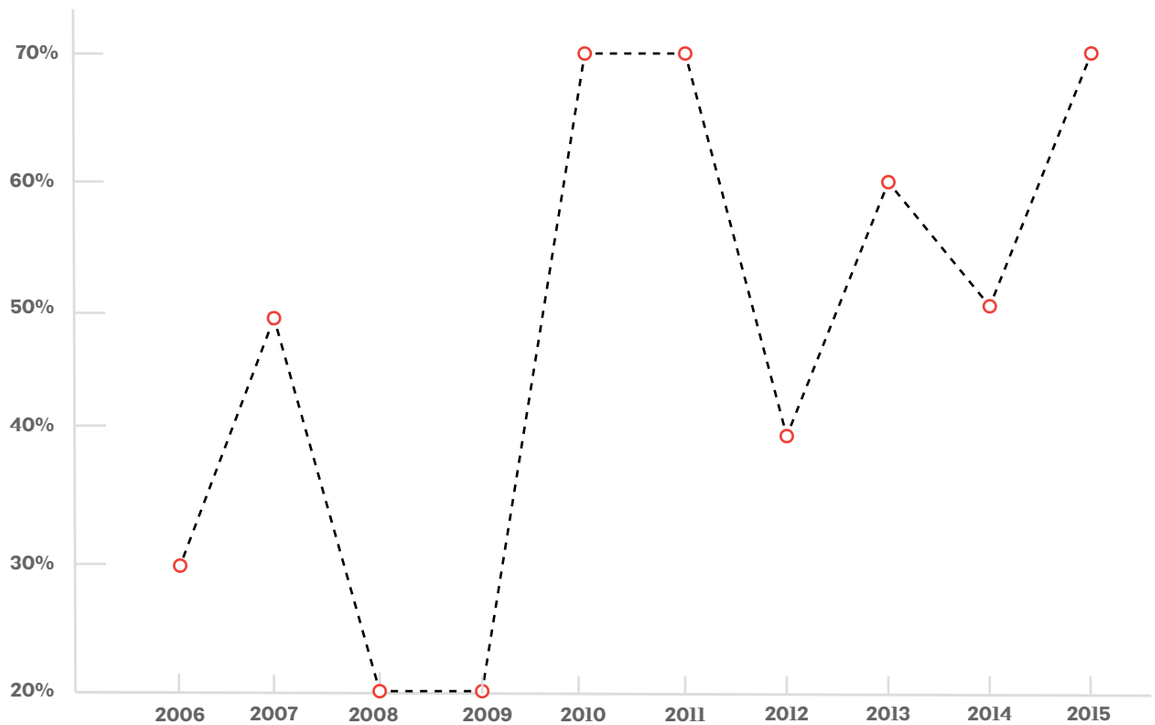
While the amount of information is not significant, it has grown dramatically in recent years. In the first five years (1997-2001), these material metrics were provided by only two projects annually. In the past five years (2011-2015), 40-80% of projects submitted this information.

Construction waste diversion may be the most reliable measure, with 40% of projects reporting overall and 80% in the past five years. The average of 83% has remained consistent and is noticeably higher than typical green buildings. For example, LEED awards credits for 50-75% waste diversion.

Because so little information is available for the other two metrics, it is difficult to draw conclusions about all AIA COTE Top Ten winners, and the averages have decreased in recent years. Nevertheless, both averages exceed LEED standards by 10-20%, so Top Ten winners have shown leadership in the responsible use of materials, especially in the past five years.

Measure 8: Materials And Construction

FIGURE 34 **Annual percentage of Top Ten winners citing material health strategies, 2006-2015**



Top Ten projects are not required to submit information about the health impact of materials, a topic of growing importance in the design industry and a strategic priority for the AIA.[61] Reviewing all narratives for Measure 8 since 2006, the researchers found that approximately half (47%) of projects mention using finishes and materials with low VOCs (volatile organic compounds), a longstanding topic in LEED. Reference to this strategy has more than doubled in Top Ten winners over the past decade. However, few projects (16%) reference any other material health strategy beyond VOC management. To date, three projects have cited the Living Building Challenge Red List, which appeared in 2006, and none has listed Health Product Declarations, but the framework just launched in 2012.

[61] In December 2014, the AIA Board of Directors approved a Position Statement recognizing that "building materials impact the environment and human health before, during, and after their use. AIA, "Materials Transparency: Managing Risk, Seizing Opportunity." aia.org/practicing/groups/kc/AIAB104034

Measure 9: Long Life, Loose Fit

Lake | Flato, Pearl Brewery / Full Goods Warehouse

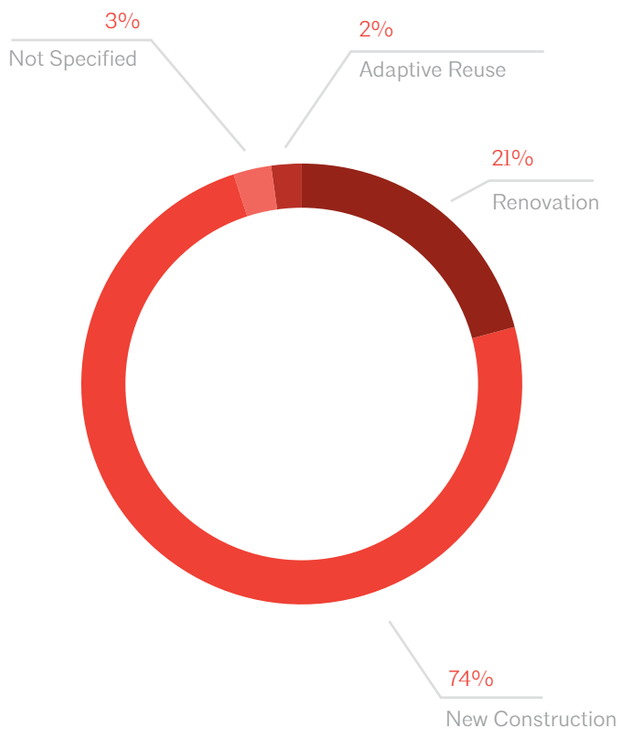
SAN ANTONIO, TX
2013 WINNER

The adaptive reuse project on a 26-acre brownfield serves as a model and catalyst for green urban revitalization in a long-neglected portion of San Antonio's inner city.

Photo: Casey Dunn

Measure 9:
Long Life, Loose Fit

FIGURE 35 Type of construction in Top Ten winners, 1997-2015



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

2016 CALL FOR ENTRIES

This measure asks submitters to provide information on "how the project was designed to promote long-term flexibility and adaptability," "anticipated service life of the project," and strategies that "enhance versatility, durability, and adaptive reuse potential." These are important aims, as research shows that renovating existing buildings can be nearly twice as efficient with resources as building anew.[62] According to the USGBC,[63] 61% of all construction is retrofits, and the AIA[64]notes that it represents 47% of architects' work.

Many AIA COTE Top Ten winners show great innovation with alternative methods to extend the life of buildings. For the Chartwell School, a 2009 winner, EHDD received an EPA grant to fund research in Design for Disassembly (DfD), in order "to facilitate changes over the school's lifetime and to facilitate deconstruction of the buildings at the end of their life."[65] Techniques include moveable walls, avoiding nails as fasteners, and dry-stacked modular blocks that can be removed and reused easily.

As a whole, however, Top Ten winners do not reflect much ambition in the existing-building market. Three quarters of winning projects have been new construction, while only a

62 Preservation Green Lab, "The Greenest Building," 2012
63 USGBC, "Green Building Facts," 2015
64 AIA, "Facts, Figures, and the Profession"
65 See Measure 9 narrative, Chartwell School

quarter have been renovations. In two decades, only four projects have been listed as adaptive reuse. All of those have been awarded in the past handful of years, so recent trends suggest that the industry could be applying better thinking to the already-built. Portland's Edith Green Wendell Wyatt Federal Building Modernization shows that architects can influence whether clients reuse existing structures or build anew.

Measure 10:
Collective Wisdom & Feedback Loops

Overland Partners, Hughes Warehouse Adaptive Reuse

SAN ANTONIO, TX.
2015 WINNER.

In a difficult climate, the project achieved a 73% energy reduction at only $71 psf.

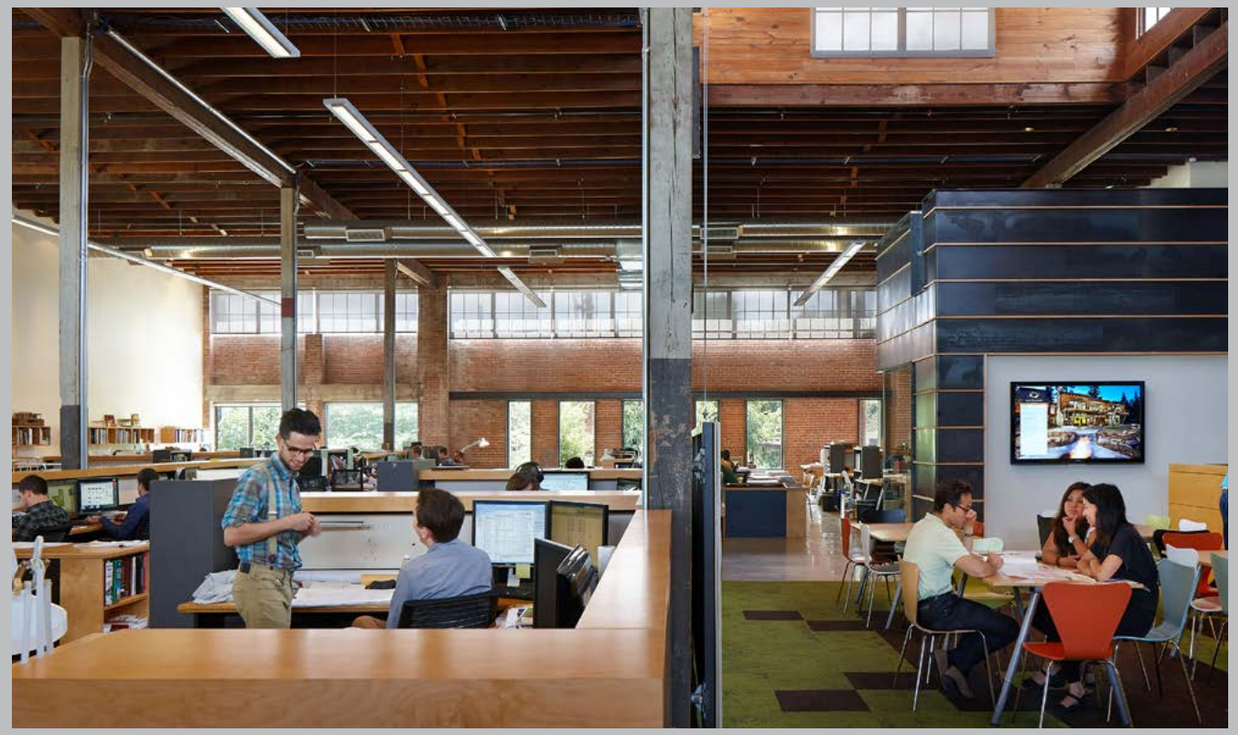
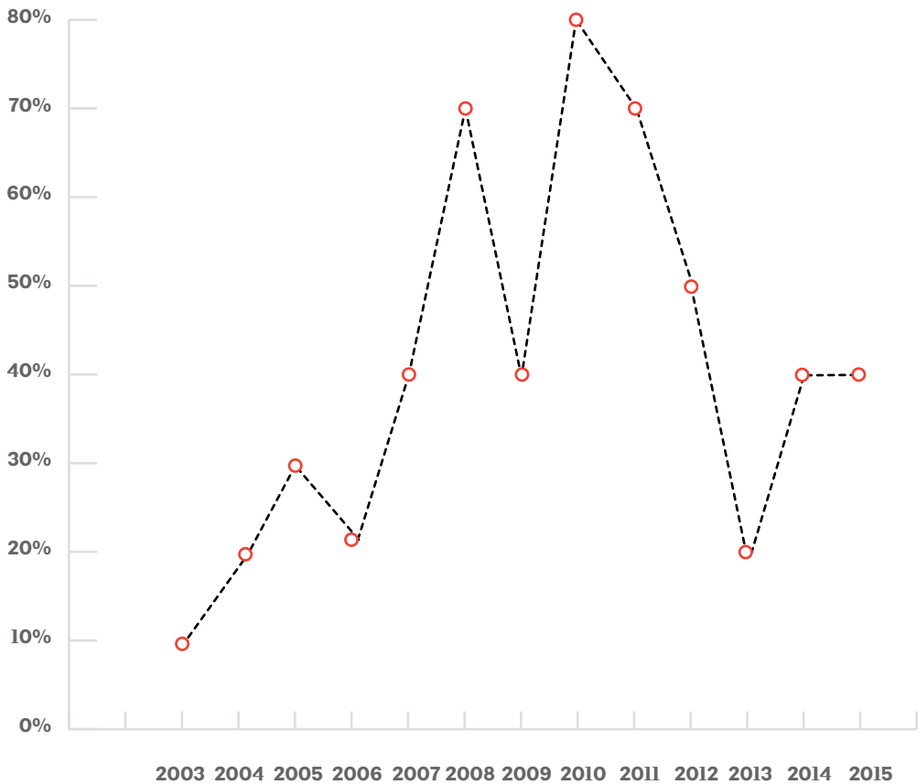


Photo: : Dror Baldinger

Measure 10:
Collective Wisdom & Feedback Loops

FIGURE 36 Annual percentage of Top Ten Winners that have conducted POEs, 2003-2015



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

2016 CALL FOR ENTRIES

Collective wisdom is what this report is intended to offer. What can we learn from AIA COTE Top Ten projects to improve performance in the future? More specifically, Measure 10 asks architects for information on process, team collaboration, analysis, costs, and general lessons learned during design, development, and post-occupancy.

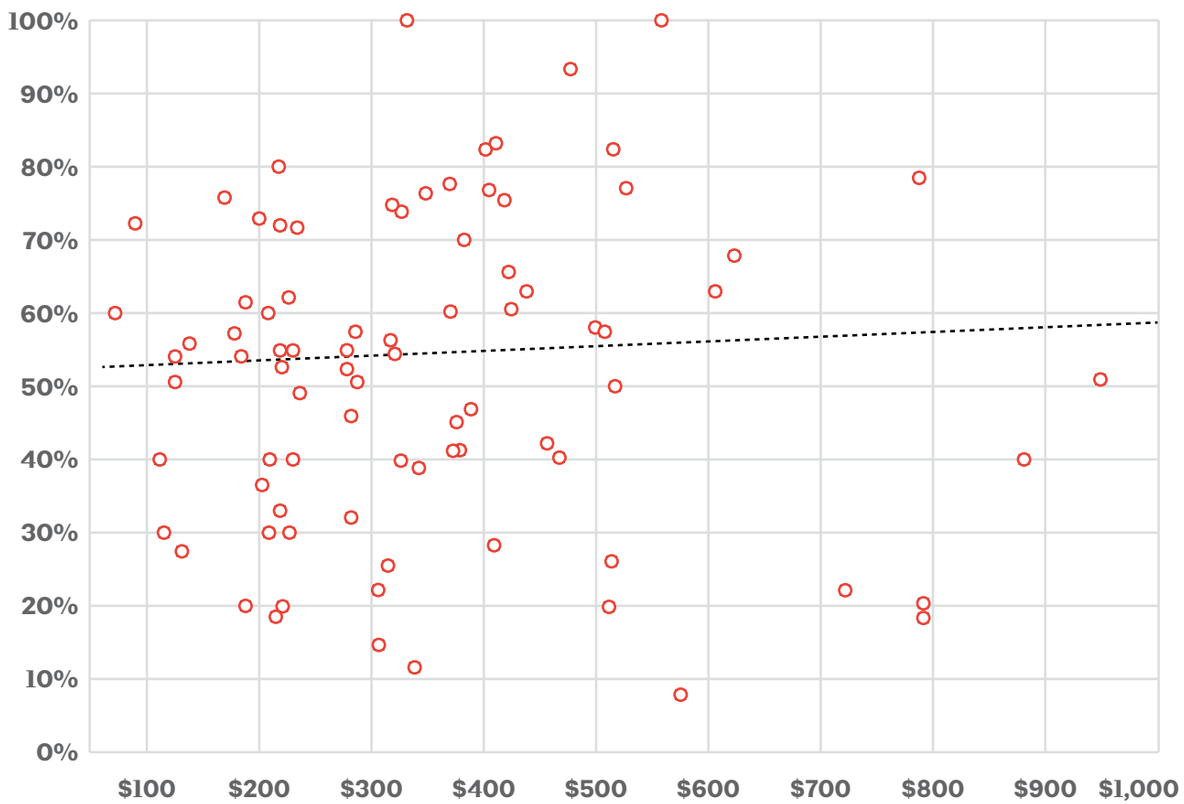
Post-occupancy evaluations (POEs) are becoming standard practice for high-performance design. Berkeley's Center for the Built Environment, which developed a popular template for POEs, sums it up: "While there has been considerable focus on measuring and regulating the resource efficiency of buildings, less attention has been paid to the issue of how well buildings meet their design intent for the occupants."[66] Research, notably that from the New Buildings Institute, consistently shows that occupant behavior is a primary factor in the performance of buildings, so aligning design intent with actual use is imperative.[67] A review of Measure 10 narratives for all winners since 2003 shows that fewer than half (41%) have conducted POEs, but the numbers have nearly doubled. In the first five years of that period (2003-2007), 24% mentioned POEs, while in the past five years (2011-2015) 44% did. In 2010-2011, 80% of winning submissions describe POE results.

Cost is becoming a priority topic. Research continually shows

66 Center for the Built Environment, 2014
67 Turner and Frankel, 2008

Measure 10: Collective Wisdom & Feedback Loops

FIGURE 37 **Cost versus Energy Reduction in Top Ten Winners, 1997-2015**
Multiple projects with the same value in a single year are represented as single nodes.



that green building need not cost more than conventional construction,[68] and the National Renewable Energy Laboratory calculates that adopting current best practices can achieve significant energy savings at no additional cost.[69] Yet, while Top Ten winners generally are reaching extraordinary energy performance, their cost effectiveness may not be as exemplary. Comparing construction cost to energy reduction shows a very modest, possibly negligible upward trend: each $100 spent per square foot yields about 1% additional energy efficiency. The cost per square foot for the 13 "net-zero energy" projects is 22% higher than the average for all projects, while studies show that net zero can be achieved for 5-12% above market rates.[70]

Nevertheless, some projects have shown excellent performance at minimal cost. Nearly sixty Top Ten projects have been built for less than $250 per square foot, and most of those have achieved over 50% energy reduction. Overland Partners' Hughes Warehouse Adaptive Reuse (2015 winner) achieved a 73% energy reduction at only $71 per square foot in the hot, humid climate of San Antonio, TX. More exemplars of higher performance with lower cost would be valuable case studies. COTE is highlighting this opportunity in the current Top Ten submissions forms, which state in Measure 1, "Exemplary cost-effective strategies are encouraged."

68 Morris and Matthiessen, 2007
69 NREL, 2013
70 Cortese, 2014

Conclusions and Recommendations

As exemplars of sustainable design, AIA COTE Top Ten winners are demonstrating that best practices and innovation can be applied to any project of any scale with any budget. As a whole, they are outpacing the industry by nearly every measure, including LEED and other third-party certifications, energy reduction, water conservation, material efficiency, and indoor environmental quality, and the rate of progress continues to rise. Further, Top Ten projects exemplify bioclimatic, place-based design and the integration of performance and design excellence.

Yet, Top Ten winners also reveal topics that the design industry would benefit from giving greater attention. As 2008 judge Jason McLennan remarked at the time, "While a competition like this shows what is being done, it can also illuminate how far we have to go.[71]

Industry Progress. The architecture and design industry would benefit from more study and progress around several key topics:

- **Regional diversity.** While Top Ten projects are being built across North America, their occurrence outside that region has been nearly non-existent (only five winners to date). More international outreach seems needed.
- **Healthcare design.** The USGBC lists healthcare as one of the most popular markets for green building, but healthcare projects account for only 3% of Top Ten winners. Promoting more ambitious design solutions would benefit that sector.
- **Indoor Environmental Quality.** Large, complex project types make daylight, natural ventilation, and views are more challenging, but they also tend to be places where people spend long periods of time, often under duress, as in hospitals. Promoting more connection to the outdoors would significantly improve these buildings.
- **Health impact of materials.** Awareness about how building materials affect human health is rising, and more demonstrations of compelling strategies, beyond VOCs alone, would be very valuable.
- **Adaptive reuse.** Sixty-one percent of all construction projects are retrofits, which are twice as efficient with resources as new construction. Yet, 75% of all Top Ten winners are new buildings. More ambition with adaptive reuse seems needed.
- **Post-occupancy evaluations.** More and more projects are conducting POEs, but fewer than half of Top Ten winners in the past five years have mentioned them. Encouraging POEs as standard practice would serve the industry well.
- **Lower cost, higher performance.** More exemplars of cost-effective strategies to achieve leading-edge results would be extremely useful case studies.

71 Sokol, 2008

Conclusions and Recommendations

Top Ten Awards. The COTE Advisory Group plans to review the Top Ten criteria carefully to clarify and strengthen the requirements and process. Some areas that would benefit from revaluation include the following:

- **Integration of sustainability and "design excellence."** While COTE and Top Ten aim to promote the intersection of design and sustainability, the criteria used to judge design quality remain vague. AIA and COTE could give more clarity to the definition of "design excellence" and how best to integrate it with performance.
- **Measures.** Some categories, such as Land Use & Site Ecology (Measure 3), would benefit from greater clarity to distinguish them from other categories.
- **Metrics.** Many of the metrics explored in this report are not required or requested in the submission documents. For example, Measure 8: Materials & Construction would benefit from more specific entry requirements.
- **Minimum performance requirements.** Currently, the Top Ten program has no minimum performance requirements. To continue to raise the bar, the program might benefit from reconsidering this.
- **Other topics.** Some priority topics, such as human health, social equity, and resilience, are not well represented in the Top Ten measures, and incorporating them more explicitly would make the evaluation criteria more robust.

Next Steps. The COTE Advisory Group plans to consider new programs to continue close study of Top Ten winners. Possibilities include:

- An online portal that updates Top Ten performance analysis every year.
- An annual education track at the national convention with ten sessions featuring deep dives into the winners.
- Regular or occasional conferences devoted to the leading edge of sustainable design.
- Closer study of the effects of the size, structure, and culture of high-performance design firms.

Additionally, the AIA Technical Design for Building Performance knowledge community's forthcoming report on Top Ten and Top Ten Plus winners will provide more in-depth study of selected case studies.

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