

DesignIntelligence® Quarterly



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Contents

VOLUME 24, THIRD QUARTER, 2018

6 From the Management and Editors

BUILDING A BETTER BUSINESS

- 9 Common and Effective Use of Language Across the Green Community
DAVE GILMORE
- 13 How Green Becomes Green
SCOTT SIMPSON

TALENT

- 16 Rethinking the Future of Sustainable Design
PABLO LA ROCHE
- 21 Evaluating Sustainable Design and Design for Health in the Graduate Presentation Program
LYNN BARRETT
- 24 Lessons Learned from Resilient by Design: How Designers Can Engage Communities to Think Forward
SANDY MENDLER

FROM SUSTAINABLE, TO RESILIENT, TO REGENERATIVE DESIGN

- 30 The Impact of Distributed Leadership and Non-traditional Partnerships
ERIC CARBONNIER, EERA BABTIWALE AND BRUCE BOUL
- 33 Made to Fit: Procurement at World Bank
DESIGNINTELLIGENCE
- 37 The Price of Water
CINDY WALLIS-LAGE

PERSPECTIVES

- 41** Part of the Solution: Defeating Climate Change
DESIGNINTELLIGENCE
- 46** Sustainability Beyond Practice
ANICA LANDRENEAU
- 49** The Practice of Governing: An Interview with Dan Watch
DESIGNINTELLIGENCE
- 51** In Search of Zen
LEILA KAMAL, TERESA RAINEY AND LEIGH STRINGER
- 55** A Case for Regenerative Design: An Interview with Jason F. McLennan
DESIGNINTELLIGENCE
- 59** Defining Regenerative Design: An Interview with Colin Rohlfig
DESIGNINTELLIGENCE

GLOBAL INSIGHTS

- 63** Australia's Ranking for Energy Efficiency Highlights Greater Issues
LEXI LIDAS
- 66** Sustainability Trends: A Global Perspective
NICO KIENZL

2018 SUSTAINABLE, RESILIENT AND REGENERATIVE DESIGN RESEARCH PROJECT

- 73** Methodology
- 76** Online & In-person Surveys
- 89** Impact & Achievability

From the Management and Editors

The third quarter 2018 issue of the *DesignIntelligence Quarterly* is the second time this year in which we've come to you with a "first in our history" change.

The first big shift happened in March, when we announced that we had become an all-digital publisher and that the Quarterly would henceforth be distributed only electronically. Now, we have another—even larger—"first" to announce.

Beginning with this edition, the *DesignIntelligence Quarterly* will be available free of charge to those who share our dedication to elevating architecture, engineering, construction and design, as well as to the positive impact that A/E/C organizations can make on human life and the natural environment.

At DesignIntelligence, we believe that the work done by convicted, deep-green design and construction practitioners is inspiring, but nowhere near as widespread as it needs to be. If we are to truly and effectively address the drastic environmental challenges before us, we need to do more, and to do it faster. Hence, the inspiration for this special, deep-green practice edition of the *DesignIntelligence Quarterly* and our decision to place our convictions before profit to reach as many people as possible with the important work of leaders in sustainable, resilient and regenerative design and construction.

We hope you enjoy this edition, and more importantly—share it!

What do 5,451 students have to say about their
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**BUILDING A
BETTER BUSINESS**

Common and Effective Use of Language Across the Green Community

Effective societal change occurs when communities discover and articulate their values and then find a voice, a language through which to communicate those values to society at large. Without a common language, we sound like babblers, perhaps the derivative of Babel, the biblical story told of where people were confused and conflicted because of the lack of a common language. In the absence of such commonness, little positive yet much negative can occur.

DAVE GILMORE

What is perhaps the most difficult challenge to the success of the green community is this problem of language. The plethora of terms, acronyms and generally referred-to concepts makes for a spaghetti bowl of confusion to any audience outside the domain of green. Yet it is this audience that matters most in our collective ambition to reverse human-originated destructive climate change.

In the enthusiasm to drive a better green consciousness, we have launched a fleet of a thousand small boats, each with a message and mission. Yet the value of synergy, unity and collective voice are lost, and the results are obvious. Fragmentation is the enemy of effectiveness.

Traveling extensively across the globe over the past eighteen months, visiting scores of architecture, engineering, construction and stakeholder organizations has been eye-opening and enlightening. More lessons and observations than can be recorded in this article fill my journal. But the one resounding observation is this problem of language that plagues the effectiveness of the green movement.

This year DesignIntelligence Research conducted a five-city series of Action Forums titled “From Sustainable, to Resilient, to Regenerative Design.” We visited with leading thinkers, designers, architects, educators, engineers and constructors from coast to coast. We met in Los Angeles, Chicago, New York City, Boston and Seattle. We surveyed the audiences. We heard moving presentations. We debated, and argued, and shook our heads, and sighed, and documented our exchanges. We inspired participants and incited action. Yet over and over again, from place to place we encountered this problem of language.

“When asked for definitions of green-centric words like *sustainable* and *resilient* and *regenerative*, without fail we heard differences, nuances, conflicting concepts and synonymous overlaps. No single audience came to a settled consensus.”

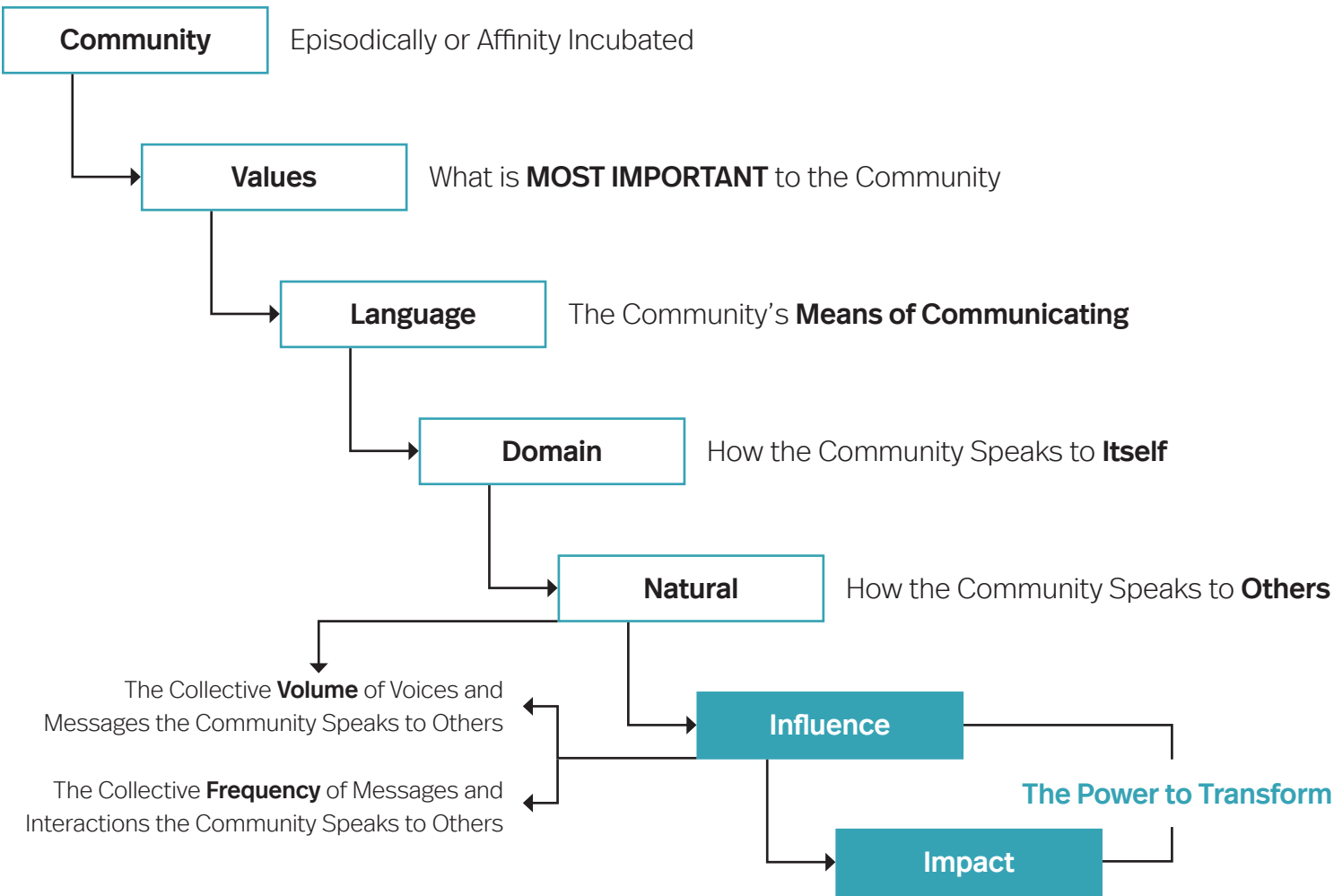
When asked for definitions of green-centric words like *sustainable* and *resilient* and *regenerative*, without fail we heard differences, nuances, conflicting concepts and synonymous overlaps. No single audience came to a settled consensus.

How might we understand this challenging disunity and resolve it? How can the green movement become pervasively effective as opposed to marginally so? We offer the following as a start:

Community

As green thinkers and doers, we came together as a community to bear a reconciling influence through society upon the earth and its constituent systems. Some joined the community to fight against, others to fight for, but all joined to reverse the destructive trend and restore wholeness to the environment of our shared planet.

The Anatomy of Societal Effectiveness



In many cases, people joined the community because they were triggered by an episode, an event or an experience that suddenly jolted them onto a different trajectory of thinking, speaking and behavior. These episodically generated converts are often marked by passion, energy and focus on action and immediacies. We value each and every one, for these passionate ones refuse to let us collectively fall into complacency or discouraged indifference. These members speak to our souls and move us forward.

Others joined the community through the process of incremental enlightenment. Over time and through various interactions, the truth of our human and environmental condition became increasingly clear and their intellect triggered affinity. Convinced of the problem and moved to make a difference, these members engage society on a relational and intellectual basis, hoping to enlighten others the way they were enlightened.

To be sure, there are more than these two categories of community members, but suffice it to say, they collectively have come together to make a difference.

Values

Let me suggest a start at our collective values. What I encounter across the community resonates with me as the expression of three core values: Relationship, Reconciliation and Responsibility.

We are committed to relationship. Our relationship with the environment, the natural order, is at the heart of our value set. How we interact with and connect to nature marks the quality of our relationship not only with nature but with fellow humans. Perhaps the best thing any of us can do for one another is relate well with nature by honoring how nature produces life for all it encounters. A broken relationship with nature rarely yields life.

We are committed to reconciliation. That is to say, we desire a new alignment of relationship that sustains life while optimizing the human experience. Reconciliation is always about alignment and is inextricable from relationship as all healthy relationships are aligned, unified and connected.

We are committed to responsibility. Stewardship of all we've been given is a daunting responsibility, yet is our responsibility nonetheless. Responsible interaction with nature requires us to filter our decisions and action through the grid of responsibility. What will be our altered responsibility when we destroy, abuse and damage the earth? Is this the responsibility we want, the outcomes we desire? Absentmindedness far too often accompanies our decisions and we pay a dear cost for it. But we can make better choices! We can act responsibly.

“What is perhaps the most difficult challenge to the success of the green community is this problem of language. The plethora of terms, acronyms and generally referred-to concepts makes for a spaghetti bowl of confusion to any audience outside the domain of green.”

Languages – Domain and Natural

As is common with most communities, a particular language arises supported by a specific glossary of terms, acronyms and usages. Every community has this distinctive. The scientific community, the information technology community, the sports community, even the farming community; they all have a language with which they communicate to one another. It is the language of their domain.

The consistent failure of the community in regard to societal impact is in its inability to bridge the gap between its domain language and the language of those outside its community. The language of the domain is odd and awkward to the ears of the natural language speaker. Likewise, an outsider struggles to communicate, to enter into this community simply because they are unfamiliar with the language. As a result, many an outsider stays on the outside either by choice or frustration. Therefore, the barrier to entry, to interaction, and ultimately to integration is language.

How the green community speaks to itself versus how it speaks to others is the challenge. The effectiveness, or not, of the green community to influence and impact society can be found in language.

When the collective voices and messages of the green community speaking natural language amps-up taking on volume, society pays attention. When the frequency of messages and interactions increases, society is faced with an undeniable, un-dismissible force.

“The consistent failure of the community in regard to societal impact is in its inability to bridge the gap between its domain language and the language of those outside its community.”

Natural language that can be understood far and wide, presented in high volume, and with consistently increasing frequency is not readily turned off. Coupled with conviction, passion and fact-based messages, it becomes the stuff of transformation.

Conclusion

The challenges to the green community are clear:

- Moving from fragmentation to unity
- Agreeing to a common glossary from which to empower its language
- Translating its domain language to natural language without lessening its impact
- Developing powerful messages in natural language that capture societal attention
- Organizing for influence and impact

The gauntlet has been thrown . . . what will we do about it?

Dave Gilmore is the president & CEO of DesignIntelligence.

How Green Becomes Green

It started out as a simple, straightforward idea: Let's start paying attention to how we manage our natural resources, with an eye to reducing the accelerating contamination of our air and water, using energy more efficiently, and understanding the long-term implications of our consumption-based behavior.

SCOTT SIMPSON

Seems pretty obvious, and who could say no to motherhood and apple pie? Still, it always takes time before new ideas settle into the public psyche and gain widespread acceptance. This is because no matter how compelling or convincing they may be at first glance, new ideas, by definition, disrupt the *status quo*, and people are naturally resistant to change. In order to reach a tipping point, an innovative idea must first reshuffle the deck and demonstrate how it can create benefits which exceed the cost.

At first, this is an uphill slog, because the initial investment for the research and development of new processes, products, and technologies is always front-loaded. Risk capital is needed before any returns can be realized, and those returns are always speculative in nature. However, once the proof of concept can be demonstrated, then the economy of scale kicks in, which enables the price of implementation to drop dramatically. This is what happened in the computer industry. The prototype machines were exceedingly expensive (often room-sized and staffed by people in white coats), but today's chips are amazingly cheap. We can hold in the palm of our hands a computer that is much more powerful than what was required to put a man on the moon. In fact, the cost of processing capacity has fallen so dramatically that if the same rate of deflation were to be applied to a Ferrari, it would cost less than a dollar.

The engine that drives innovation is economic in nature. If new ideas are to be embraced by a wide range of users, then people must be both willing and able to pay for them.

This is the secret to the surprisingly rapid success of the sustainable design movement. It was not that long ago that the cost of LEED certification for a typical office building was in the range of 3–4 percent of construction cost. The presumption was that for owners, the upfront cost would be repaid over the operational life of the building. This argument made sense if the original client plans to hold the investment for 20+ years, but most don't do that. However, as the market for sustainable design matured, developers discovered that LEED certification had attained a certain cache in the mind of prospective tenants and that it could generate a measurable premium in leasing rates, so that they could recoup their investment much sooner. In addition, the market responded with innovative materials and equipment (energy efficient glazing, sophisticated MEP controls, etc.). Today, LEED certification (or its equivalent) is essentially free and pretty much taken for granted. Building codes have been modified to essentially mandate that new structures will comply with LEED Silver or better. The cost of compliance makes investment sense; it's not only good for the planet, it pays big dividends. In short, this is how "green makes green."

The same phenomenon has played out in the energy markets. Coal was (and still is) the cheapest source of energy, because it is so abundant. However, its use is burdened by environmental issues, both in terms of extraction (strip mining) and contamination (air pollution and carbon dioxide emissions). A decade ago, solar power was far more expensive than coal on a cost per kilowatt basis, and so subsidies in the form of

an Investment Tax Credit were necessary to support basic research. Today, solar power is cheap enough that it has penetrated the residential market, enabling many homeowners to actually sell back excess power to their suppliers.

The U.S. Department of Energy is promoting the “Sun Shot Initiative” that aims to reduce the cost of solar power even further, by 75 percent between 2010 and 2020. Ten years ago, the total installed capacity of solar panels in the U.S. was 267 megawatts; this has increased to 9,446 megawatts today. As capacity increases, the cost drops. Between 2010 and 2015, the cost per megawatt of solar energy for industrial use has been reduced by about 30 percent, from \$4.75 to \$3.30. Cost savings in the residential market are even more dramatic, falling from \$8.00 per megawatt in 2005 to \$2.20 per megawatt in 2015, a reduction of nearly 75 percent. Solar power is clean and cheap, and there is still dramatic upside potential, since it will account for only about 3 percent of power generation in the U.S. by 2020.

“Risk capital is needed before any returns can be realized, and those returns are always speculative in nature. However, once the proof of concept can be demonstrated, then the economy of scale kicks in, which enables the price of implementation to drop dramatically. This is what happened in the computer industry.”

From an economic perspective, the picture for wind power looks quite different. Even though there are wind farms with 13,000 megawatts capacity currently under development in the U.S., this investment is being driven more by the Producers Tax Credit passed by Congress than the underlying economics. It has been estimated that construction of a wind farm with 1000 megawatts of capacity would be about the same as for a nuclear plant—\$1.75 billion. Because wind

farms can be actively productive only 30–40 percent of the time, they must be linked to backup power generation. When all the numbers are crunched, it turns out that wind power is not economically competitive with hydro, coal, oil, gas, solar, or nuclear fuels ... at least not yet. Wind might seem “free,” but converting it to real useful energy, and then distributing that energy, is simply not cost effective.

The economics of “green makes green” can also be applied to carbon emissions. A key aspect of the Paris climate agreement is that in order to keep the average global temperature rise to less than 2 degrees Celsius, carbon dioxide must be *removed* from the atmosphere on a massive scale (a process called “negative emissions”). One way to achieve this would be to plant lots of trees, but that would require reforestation of an area the size of Canada or India. However, it is possible that an industrial process developed by a firm called Carbon Engineering may accomplish the same thing at far lower cost. A pilot plant to demonstrate proof of concept is already operational, and the initial projections are that the system could capture a ton of greenhouse gas for between \$94 and \$232. In addition, Carbon Engineering believes that it could generate additional revenue by converting the captured carbon dioxide back into fuel. Who knew that carbon emissions could become big business?

When it comes to sustainability, the bottom line really is the bottom line. While human beings are very effective at creating new problems for themselves, fortunately they are even more clever at solving them. Good ideas by themselves are rarely sufficient to change behavior. However, it is quite possible to do well by doing good. Far from being the “dismal science,” economics can provide both the framework and the incentives needed to address a wide variety of issues efficiently and effectively. And that’s how “green becomes green.”

Scott Simpson is the editor-at-large of DesignIntelligence and a Senior Fellow of the Design Futures Council.

TALENT

Rethinking the Future of Sustainable Design

Sometimes, the best way to move forward is to look back. Many of the earliest examples of architecture and design responded to both site and climate and incorporated natural “passive” climate control strategies. It was only with the advent of cheap energy and advances in environmental system controls that designers were able to decouple building design from the external environment.

PABLO LA ROCHE

This made most buildings intensively energy dependent, increasing their greenhouse gas emissions and making them diametrically opposed to the sustainable designs of the past.

The United Nations Environment Programme (UNEP) Sustainable Buildings and Climate Initiative (SBCI) (UNEP SBCI, 2010) estimates that GHG emissions from the building sector are around 33 percent of total emissions. The U.S. Energy Information Administration (EIA) states that the building sector consumes nearly half (47.6 percent) of all energy produced in the United States (2013, Architecture 2030). Furthermore, 75 percent of all the electricity produced in the U.S. is used just to operate buildings. To make matters

worse, these numbers typically account only for emissions from building operation, although buildings also generate GHG emissions through construction materials and processes, water consumption, waste and even site work.

The climate crisis means that we must rethink the future of sustainable design, but it also means drastically altering our thinking of the present. All new buildings should be designed to be carbon neutral. To achieve this, buildings should be designed to high-performance efficiency standards and generate and/or procure enough renewable energy to offset emissions from other sources. I propose a three-pronged approach to the design of carbon neutral buildings through practice, education and research.

PRACTICE

Several strategies organized in the following categories will lead to the implementation of low carbon/carbon neutral buildings in practice: design, codes, tools, basic principles and awards.

Design

Most current research on sustainable architecture is directed to improving established technologies, such as HVAC systems while making buildings tighter and better insulated. The better way forward is for architecture to incorporate

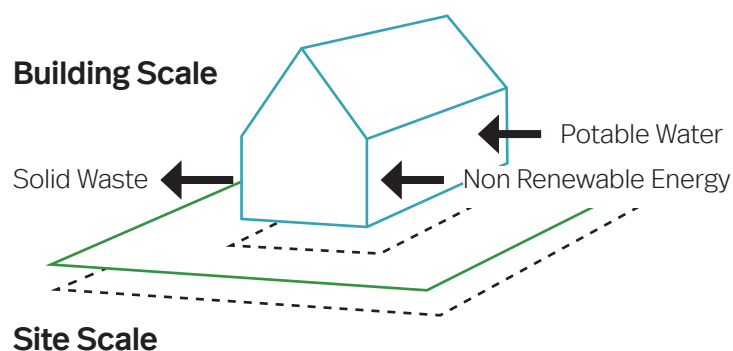


Figure 1: Building Emissions and Environmental Interactions
Source: *Carbon-Neutral Architectural Design* by Pablo La Roche

“passive” design strategies first. Passive design transfers energy from a building to various natural heat sinks, using heat flow paths that do not exist in conventional buildings. Because of how they collect, store and distribute energy, passive heating and cooling systems can provide thermal comfort with lower capital and operating costs than conventional systems. Their simple design also means that, in many cases, they can be built at lower costs, using local labor and resources. In turn, this generates income that stays in the community and contributes to economic and social sustainability and resiliency on top of the environmental benefits.

Sustainable design must also address social inequities. It is not enough to design the latest and greatest high-performance building; we must also design for those who have the least. During extreme heat events, for example, inadequate building design and expensive energy make air conditioning prohibitive for the poor. This can cause health problems and even death, especially in the elderly. The right design strategies can address the issue of energy poverty.

Codes

Building energy codes are another important tool for addressing the climate crisis. When implemented correctly, they promote innovation and improve performance. California is a good example: In July of 2018, the California Air Resources Board (CARB) announced that greenhouse gas emissions in California in 2016 fell below 1990 levels for the first time since emissions peaked in 2004. Emissions dropped 13 percent

statewide since the 2004 peak while the economy grew 26 percent. California now produces twice as many goods and services for the same amount of greenhouse gas emissions as the rest of the nation.

Clearly, codes do not have to restrict growth but can help large populations invest in their own future. However, most building codes currently evaluate an incomplete reality because they regulate the effects of only some of a building’s physical properties and energy consumption. Architecture 2030, for example, has developed a zero-net-carbon building code standard. Their newly released ZERO Code is a national and international building energy standard for new building construction that integrates cost-effective energy efficiency standards with on-site and/or off-site renewable energy resulting in zero-net-carbon buildings. The ZERO Code includes prescriptive and performance paths for building energy efficiency compliance based on current standards that are widely used by municipalities and building professionals worldwide.

Digital Tools

3D printing, three-dimensional digital visualization and rendering tools, building information modeling (BIM) and virtual and extended reality are now common in architectural practice. These tools on their own cannot help us address energy efficiency; it is our responsibility as designers to better integrate energy modeling tools in the design process, especially in initial design phases. Energy modeling is still not very transparent, nor is it easy to move between architectural and energy modeling tools.

33%

TOTAL GHG EMISSIONS FROM
THE BUILDING SECTOR
(SOURCE: UNEP SBCI)

48%

OF ALL ENERGY PRODUCED
IN THE U.S. IS CONSUMED BY
THE BUILDING SECTOR
(SOURCE: EIA; ARCHITECTURE 2030)

75%

OF ALL ELECTRICITY
PRODUCED IN THE U.S. IS
USED JUST TO OPERATE
BUILDINGS

Two current developments that could contribute to an increase in energy modeling tools in architecture will be the new edition of the AIA's *Architect's Guide to Integrating Energy Modeling in the Design Process*, and ASHRAE Standard 209–2018 *Energy Simulation Aided Design*. As always, modeling early and often is a recipe for the successful design integration of passive and efficiency strategies.

Basic Principles

Understanding the foundational principles behind sustainable design is crucial to innovation. While rating systems are important and have helped achieve a market transformation, I would argue that they do not always promote deeper thinking or sustainable innovation. Furthermore, in some cases, the green rating system process is detached from the design process and is seen by the design team as a constraint instead of an opportunity to design a more exciting and innovative building. Having practitioners with a deep understanding of passive design strategies leads to a more comprehensive approach.

Design Awards

By recognizing excellence in sustainable design, design awards demonstrate innovation and promote advancements in sustainability. The AIA Committee on the Environment's Top Ten Awards is just one example of a program that promotes the integration of performance-driven design through quantification as one of the criteria. More and different types of programs that reward this type of design would encourage sustainable innovation.

Beyond Carbon

Carbon is not the only environmental issue we face; water, scarcity of resources, indoor air quality, as well as social equity all warrant the attention of the design community. In addition to performance, design must now consider *adaptation*, *mitigation* and *resilience*. Buildings should *adapt* to local conditions through measures that reduce the vulnerability of natural and human systems against actual or expected climate change effects. We must *mitigate* climate change through technological change and substitution that reduces resource inputs and emissions per unit of output. Finally, we must design *resilient* buildings that

have the capacity to adapt to changing conditions and maintain or regain functionality and vitality in the face of stress or disturbance (Resilient Design Institute). Both adaptation and mitigation are important and complementary to each other. Effective mitigation measures will reduce the impacts to which we will need to adapt, and effective adaptation measures will reduce the impacts associated with any given climate change effect.

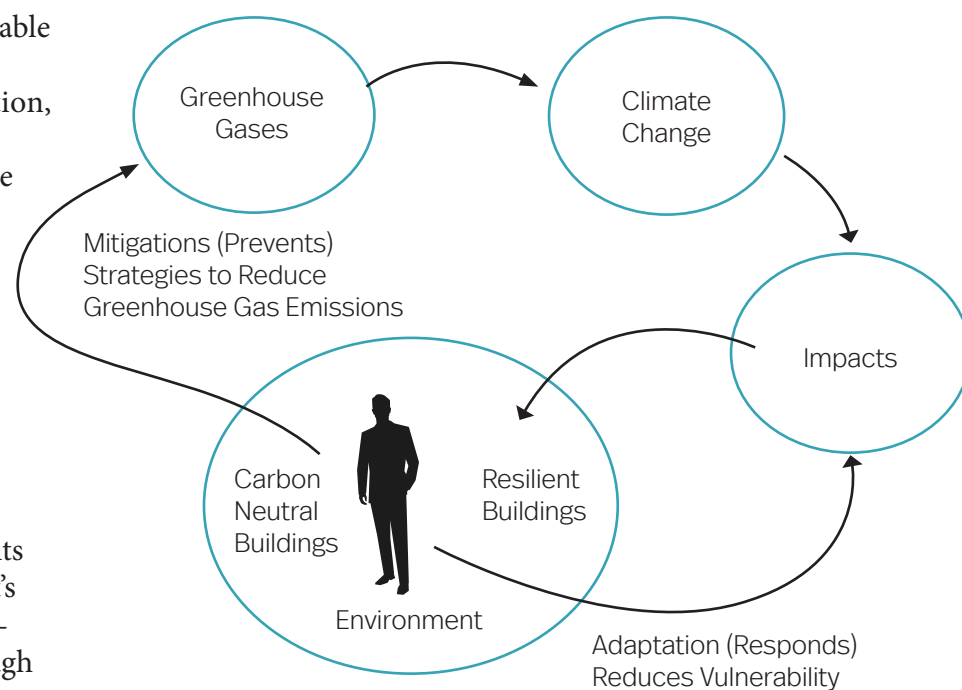


Figure 2: Resiliency, adaptation and mitigation

Source: *Carbon-Neutral Architectural Design* by Pablo La Roche

RESEARCH

Developments in architectural practice and the need to further advance the profession emphasize the importance of research. The construction industry evolves very slowly and building design and construction are behind other fields in innovation. While automobiles are advancing to driverless after their first century, buildings are essentially the same as they were in the same period. If we prioritize innovation, and if all designers innovate in at least one area of every project, we could quickly advance the profession.

Architectural research is becoming increasingly important but it's far from being sufficiently recognized in practice and even in academia, where architecture schools are strong in either training architects for the profession or for scholarly research, but typically not both. Furthermore, funding for architectural research is minuscule compared to other fields such as physics and engineering. Architects are problem solvers and effective as innovators. There are many opportunities for research in architecture connected to sustainability, developing and improving passive cooling systems with new technologies and materials, and developing more sophisticated energy modeling tools. Many universities and research institutions have already developed tools and programs to support sustainability and resilient research, but they have no funding for continued development. In addition to state and federal entities, this funding could come from other sources such as energy utilities.

EDUCATION

Education is an important part of the three-pronged approach toward achieving carbon neutral buildings. Future architects must have the knowledge and skills to design the buildings needed to keep our global temperature rise well below the 2-degree limit. For this to happen, architecture schools must provide a more comprehensive sustainable design education to all students. Currently, architecture students in the United States are exposed only to basic concepts in sustainable design. They are introduced to more advanced concepts such as energy modeling or the design of zero net energy buildings only in advanced graduate or undergraduate seminars or upper division studios. Because these courses are not required, only a small fraction of architecture students can enroll in them.

The following principles should be considered to improve sustainability in architecture education:

- Introduce sustainability as early as possible in the program and teach research methods to undergraduate students.
- Integrate design directly in lecture courses that teach sustainability. Architecture students typically learn by implementing concepts from lecture courses in their

design projects, especially in studios. This learning can also occur directly in a lecture course, where students develop a design project to implement concepts learned in lectures.

- All design studios should incorporate sustainability. When necessary they can reduce the number of variables to consider in a design problem, allowing students to develop a deeper understanding of sustainability.
- Increase student understanding of building physics, with a special emphasis on heat transfer through the building envelope by conduction, convection and radiation.
- Increase student understanding of energy modeling tools, teaching students how to use digital and analog simulation software as appropriate to test concepts and ideas. Once the students understand the concepts, they can use tools to evaluate them.
- Education should include hands-on activities that provide students with unique learning opportunities to be more creative and go beyond established strategies and methods providing them with opportunities to test ideas. Yes, insulation and shading are good, but what if the building becomes the air conditioner or the furnace? Is this idea familiar or radical? Students would then design, build and test passive heating and cooling systems that perform incredibly well, learning how to integrate research in their process. The look in their eyes when they feel the cooling or heating and collect the results is priceless!

“Carbon is not the only environmental issue we face; water, scarcity of resources, indoor air quality, as well as social equity all warrant the attention of the design community. In addition to performance, design must now consider *adaptation, mitigation and resilience.*”

Organizations like the Society of Building Science Educators (SBSE) or Building Technology Educators' Society are dedicated to supporting excellence in the teaching of environmental science and building technologies through a broad range of practical activities. SBSE at their 2009 Retreat in Québec proposed that the National Architectural Accrediting Board (NAAB) and the Canadian Architectural Certification Board (CACB/CCCA) set as a Condition for Accreditation that every North American architecture school's curriculum provide all graduates with the theoretical and practical competence to consistently design high-quality carbon neutral/zero net energy built environments. Unfortunately, this proposal was rejected and even though this seems to be a priority for the planet, it does not seem to be a priority for architectural accreditation boards.

Still, sustainable education is important to architecture firms and is typically one of their hiring priorities. Design firms want to meet their 2030 Commitment targets and hire graduates that know how to use analysis tools to inform their designs.

Continuing education for architects is also an important part of the education component. Since 2012, AIA members no longer have a sustainable design education requirement. However, it would be helpful to reinstate it. Even though there is more awareness, sustainable design practices are far from being mainstream.

“Building energy codes are another important tool for addressing the climate crisis. When implemented correctly, they promote innovation and improve performance.”

THE BUILDINGS WE NEED

We need technical knowledge to innovate and ensure that our ideas will work but we also need sustainable design skills. Architecture is the marriage of art and science. In my view, if a building is not environmentally responsive, it cannot be a beautiful building.

We must urgently move toward buildings that John T. Lyle would call “regenerative” and that can ultimately regenerate deteriorated environmental systems back into existence, creating a “better” environment than initially found.

We must teach architectural research methods, implement more research in practice and invest more in building research.

Clear ecological literacy goals should be implemented in the accreditation requirements for architecture schools, which should include carbon neutrality, resilience and adaptation to our rapidly changing climate.

Our responsibilities increase by the minute. Our buildings not only have to perform well, they must be resilient and designed for passive survivability. Climate-related natural disasters will only increase in frequency and intensity and we cannot continue living in buildings that become uninhabitable in the absence of outside energy.

As we strive to meet these challenges, it is good to remember Glenn Murcutt's saying: *Follow the sun. Observe the wind. Watch the flow of water. Use simple materials. Touch the Earth lightly.*

There is much to do. And there is little time.

Pablo La Roche is professor of architecture and interim director of the Lyle Center for Regenerative Studies at Cal Poly Pomona University, and sustainable design leader and associate vice president at CallisonRTKL.

Evaluating Sustainable Design and Design for Health in the Graduate Presentation Program

DesignIntelligence often hears from firm leaders that a candidate's education in sustainable design is an important priority in their hiring decisions.

LYNN BARRETT

Because our world faces enormous environmental and climate challenges, we wanted to help students understand how sustainability and regenerative design practices can transform the A/E/C industry and the built environment. And we wanted to help them understand how they can present their ideas of sustainable design to a potential employer.

Sustainability was once met with vigor, igniting a movement in the A/E/C industry. A pivotal piece of this was LEED (Leadership in Energy and Environmental Design), which helped people to think differently about how they design and build relative to the natural environment and energy. But that vigor has waned somewhat and, while LEED is still relevant, it has become more limiting and is now often approached with a check-box mentality.

“Designing to meet code is not adequate. When we do, we are settling for the WORST building allowed by law.”

Margaret Montgomery, NBBJ

The concept of sustainability has advanced greatly through the ideas of resilient and regenerative design. At the Design Futures Council Leadership Summit on Sustainable Design in Toronto, Craig Applegath of Dialog talked about his company's resilient

and regenerative approach: “[It is] reducing harm, adapting to climate change, and regenerating/repairing the damage we’ve done. Projects we’re working on in that arena: net positive buildings; resilient and regenerative building fabric; ecologically harvested wood construction.”

Another growing body of evidence suggests the built environment plays a vital role in human health. Design for health is also coming under the sustainability umbrella. Dan Watch of Perkins+Will said: “Healthy is part of sustainability.”

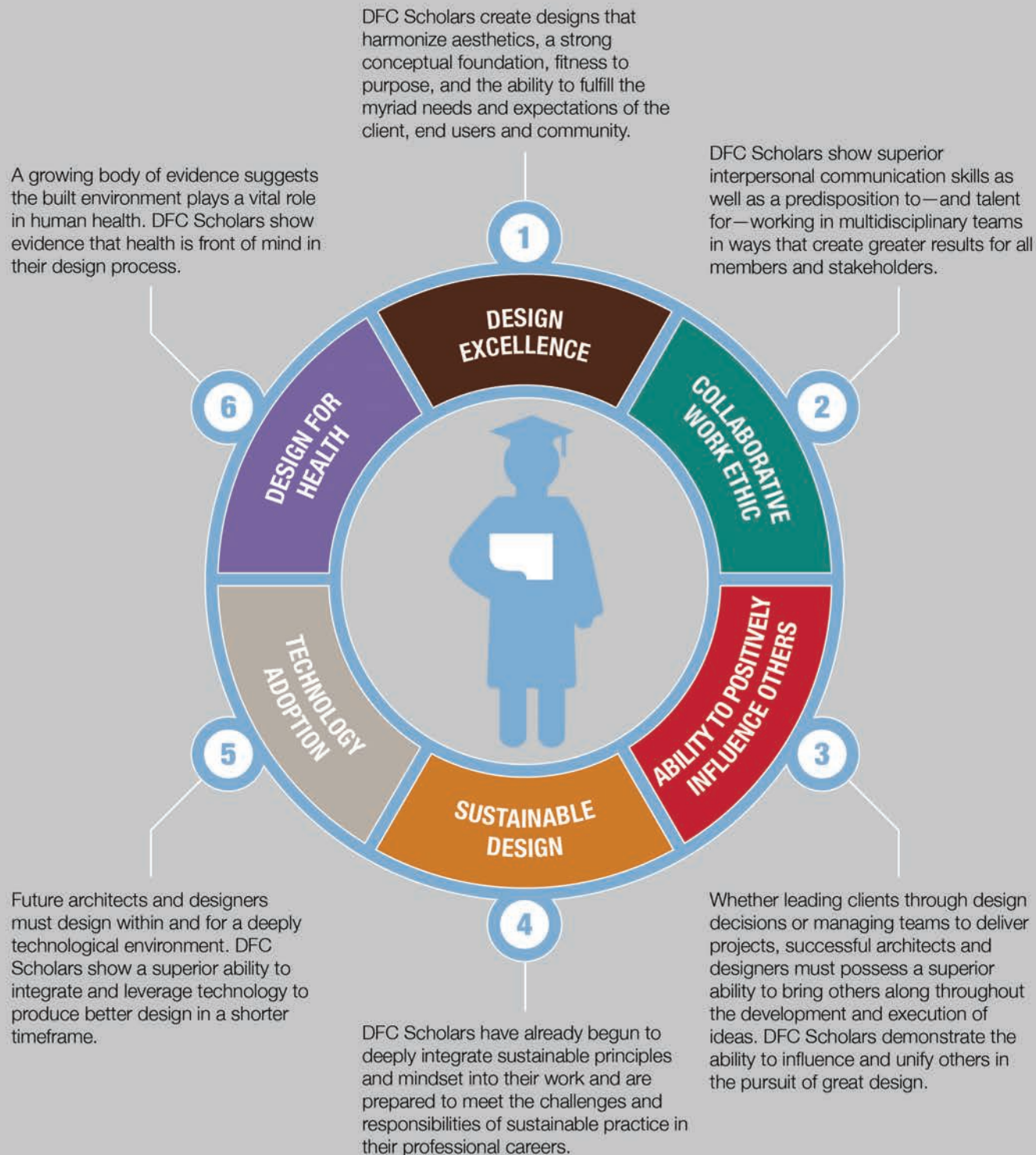
Sustainable/resilient/regenerative design and design for health are becoming fully integrated into some firms as a new standard of practice. And some educators have built curriculum where studio classes offer a sustainable/resilient/regenerative design and design for health component. For true success though, in practice and in studio, *every* project must have these concepts fully integrated.

This new reality is the message that DesignIntelligence wants to impress upon students as they enter professional practice. It is the reason we devised a model to evaluate sustainable design and design for health in our new Graduate Presentation Program (GPP).

Two years ago, DesignIntelligence launched GPP to help bridge the gap between students graduating from architecture programs and firms seeking talented architects. To evaluate

THE SIX CHARACTERISTICS OF A Design Futures Council Scholar

DFC Scholars are not simply the best design students, or those with the highest GPAs. Rather, they embody the qualities that align most strongly with core tenets of the DFC.



the numerous students who would be nominated by participating schools, we needed core tenets to help guide us through the selection process. To better serve the students, the participating schools and the firms, we consulted with professional practice on these core tenets. These six characteristics emerged as our guide:

- Design Excellence
- Collaborative Work Ethic
- Ability to Positively Influence Others
- **Sustainable Design**
- Technology Adoption
- **Design for Health**

The student resumes and portfolios are evaluated against these six attributes. There have been exceptional examples of sustainable design, but design for health has been the most challenging area for students because it is the newest. DesignIntelligence recognizes this gap overall, but we have seen promising first steps from future professionals in the “design for health” category.

Students who met all or most of the characteristics received the Design Futures Council Scholar designation. Their work was shared with more than 300 architecture firms in the United States.

So how would we advise students on how to present their sustainable designs to a potential employer? Not surprisingly, our guidance centers around the attributes, characteristics and our expectations of a DFC Scholar:

- Demonstrate that you have already begun to deeply integrate sustainable principles and mindset into your work and are prepared to meet the challenges and responsibilities of sustainable practice in their professional careers.
- Show evidence that health is front of mind in your design process.

Lynn Barrett is the institutional affiliate liaison of DesignIntelligence.

Lessons Learned from Resilient by Design: How Designers Can Engage Communities to Think Forward

The challenge of climate adaptation in the SF Bay area highlights a shift taking place in our collective consciousness about sustainability. The need to mitigate impacts to the climate is still urgent; however, the threat of climate change that is already underway demands attention and proactive planning.

SANDY MENDLER

The Urban Land Institute began sounding the alarm within the SF Bay Area real estate business community with a 2015 report. The report spoke to the need for innovation in governance, finance and design to meet a challenge that is no longer in the distant future, noting that over 280 square miles of low-lying land in the nine county Bay area region is vulnerable to being inundated as soon as 2050ⁱ.

While initial conversations about climate adaptation and shoreline resilience have been led by engineers, designers have an opportunity to shape both the projects and the messaging around the shift to a resilience mindset to reinforce a vision that focuses on people and multi-benefit solutions that benefit communities and ecosystems. Laura Tam, Sustainable Development Policy Director, San Francisco Planning and Urban Research (SPUR)—an influential Bay area think tank—put it this way: “The sustainability conversation we were having prior to resilience becoming more of a prominent concept was in some ways lacking a human focus. We can’t address environmental goals without taking care of people today, not just the environment for tomorrow, but resilience could be the agenda for those that don’t want to care about future generations. The concept of resilience without sustainability is not holistic enough—we need to have both ... we need to think forward.”ⁱⁱⁱ

The concern is that if resilience planning takes an overly “defensive” approach, investments could prioritize short-term solutions protecting individual assets, with energy re-directed away from sustainability goals and many under-invested areas left behind. Thinking forward means working holistically to invest in multi-benefit solutions that restore the health and vitality of all living systems, while strengthening communities and addressing the challenges of inequality and structural racism.

Strategies that restore the urban forest, creeks, parks, greenways and coastal marshlands provide valuable “ecosystem services” that improve air and water quality, moderate temperature and offer protection from flooding and rising tides. When embedded in a multi-benefit planning approach, resilient infrastructure investments can integrate housing, transportation and jobs as part of a holistic resilience framework. Deb Guenther, landscape architect at Mithun and design partner for the Home Team, calls this a “both-and” approach that “moves away from designating places as priority development or priority conservation areas—instead creating priority resilience areas that do both, using hybrid ecologies to build resilience while also creating healthier and stronger communities for the people that live there.”ⁱⁱⁱ

Richard Mullane of the Australia-based firm Hassell, noted that the shift from sustainability to resilience has been happening for some time internationally. “We work a lot in Australia and Asia, and sustainability had been a selling point for new city development, but it has lost meaning and relevance ... too much focus on cool technology, resilience makes the conversation more human and less tech focused. In China there has been a shift from EcoCities to Sponge Cities with a focus on major green infrastructure.”^{iv}

Either way—whether as hard infrastructure or integrated multi-benefit natural systems, or a combination of the two—the cost of climate adaptation will be high. Preliminary estimates of the cost to protect infrastructure and assets in the nine-county bay area put the price tag at about \$35 billion.^v The investment needed in public infrastructure creates an opportunity for designers to envision multi-benefit projects that increase their value to communities bearing the cost, and it may be that making the case for multi-benefit projects is the best way to win the support needed to get them done.

This article provides a brief overview of key discoveries and lessons learned from the recent yearlong Resilience by Design Bay Area Challenge, with a focus on how design professionals can evolve their practice, build skills and form partnerships to play a leadership role in the transformative projects that our communities need. The projects developed during the Resilient by Design (RbD) challenge provide compelling images together with implementation planning and preliminary funding strategies demonstrating the potential of this integrated framework.^{vi}

“Thinking forward means working holistically to invest in multi-benefit solutions that restore the health and vitality of all living systems, while strengthening communities and addressing the challenges of inequality and structural racism.”

Resilient by Design (RbD)

The Resilient by Design Bay Area Challenge was launched in the summer of 2017, a year-long process to spur creative community-driven design to address resiliency challenges throughout the nine-county Bay area. The challenge brief encouraged a comprehensive approach to environmental and social resiliency with a focus on equity and inclusion for under-served communities.^{vii} Nine multi-disciplinary design teams participated, comprised of leading firms locally, nationally and internationally.

The driving idea behind the RbD process was that design thinking would promote more holistic problem solving and engage communities with a more public process. Amanda Brown-Stevens, managing director of Resilient by Design, explained that “RbD was an extreme version of design professionals leading an engagement process. Typically, local government would be the ‘client’ for a large-scale planning process like this. We wanted to flip the dynamic so that designers are leading—multi-disciplinary collaboration was the goal, but we also wanted to bring experience from other places—this was a key part of the competition.”^{viii}

RbD was modeled after Rebuild by Design, a competition launched by the Hurricane Sandy Rebuilding Task Force in response to over \$65 billion in damages and economic loss in NYC and surrounding areas from the 2012 hurricane.^{ix} The NYC Rebuild competition had a sense of urgency, strong local government participation and significant funding from US Housing and Urban Development (HUD), whereas SF Resilient by Design had none of these. RbD was about developing ideas to avert disaster. It had interest from local governments, but no identified sources of funding nor a process for implementing the plans. This difference led to important learning opportunities for designers, as financing training and advising was integrated into the program.

What is different?

Like the comprehensive planning process in California, which integrates planning across silos from housing and transportation to natural systems and infrastructure, resiliency planning requires even more inputs, a scale that typically extends

beyond political boundaries, and a very intentional focus on social impacts and equity. Resilience is fundamentally about protecting people and their community support systems, not just the physical assets of the city.

Input data are changing as climate change impacts everything from predictions of 100-year storm events, which are occurring more frequently, to projections of increased rainfall alternating with increased drought. Alexis Roberts, economic and policy analyst focused on climate change at Hatch, notes that “all of the levels of service and rules of thumb are changing, not just based on climate change but ‘climate weirdness’ because even when predictable it is more extreme.”^x Geophysicist and climate expert Klaus Jacobs of Columbia University advised the teams at the outset of the design challenge to get used to change, because we are in the midst of a shift, from climate that has been stable for thousands of years to one that is changing, and the change is accelerating. Projections for sea level rise in the bay area vary—from three feet to six feet or more by the end of the century—however, the water will continue to rise, and future stabilization of the climate is a long way off.

“Resilience is fundamentally about protecting people and their community support systems, not just the physical assets of the city.”

Another major difference is the planning scale, with resilience projects often defined by the watershed, which can include multiple cities and counties with complex overlapping jurisdictions. This becomes especially challenging given the increased importance of community engagement and government partnership as a part of the design and planning process. And finally, the issue of equity needs to be front and center. The SF Bay area is in the midst of a severe housing crisis and inequality is increasing by all measures, from income inequality to unequal health outcomes, as low-income people and people of color are being displaced to areas far from transportation,

jobs, parks and open space, and healthy food, while enduring exposure to environmental hazards from industry and roadways. Holistic multi-benefit resiliency strategies address both current and future needs that enable people to thrive.

New expertise is needed

The intensive yearlong RbD process brought design teams together for extensive information sharing and group learning, and ultimately revealed the complexity of a challenge that is about so much more than shoreline protection. Expertise is needed to fill information gaps and model complex interactions throughout the watershed, to seek out synergies between natural and built landscapes, and to address governance and ownership issues related to green infrastructure. Teams also need to build communications and engagement skills to be effective.

More expertise is needed to understand the complex interrelationships between land and water; for example, the region is experiencing subsidence with land in some areas sinking even faster than sea level is rising. Dr. Kristina Hill, assistant professor at UC Berkeley and member of the All Bay Collective team, was a vocal proponent of the need to address subsurface dynamics: “To imagine how our coastal areas are going to change, we need to be able to anticipate the impacts of higher water tables as well as higher tides. Rainwater won’t seep into the ground anymore as water tables rise—and that’s going to be a big change. Water will actually seep up out of the ground when it rains, and tides are high ... this has big implications for seismic risks, pipe capacity, and exposure risks from existing soil pollution.”^{xi}

Teams also need to help build literacy around the watershed and its management, to inform the public and the agencies that steward these systems. For example, the Public Sediment team developed a multi-benefit proposal called Unlock Alameda Creek with new public open spaces along the Alameda Creek including “flood rooms and mud rooms” to restore the flow of the sediments, replenishing mud along the edges of the bay.^{xii} The team engaged extensive community education about sediment and raised important questions about how flood management districts will need to either

partner or expand their expertise to take on habitat restoration and parks management as well as flood control.

In addition to technical expertise, resilience planning requires strong communication and engagement skills to engage communities when resilience situations feel far off and other priorities seem more pressing. Richard Mullane described their approach to the Resilient South City project in South San Francisco,^{xiii} which included renting a storefront for use as a community meeting place for gathering input and sharing ideas, and also talked about the importance of engaging youth: “This helps us to set an ambitious agenda—it is easier to do with kids—they are more optimistic and have less preconceptions. ... Ultimately, our goal is to focus on what communities love about their place.”^{xiv}

And finally, there is collaboration and the importance of engaging local expertise. Landscape architect Tim Mollette-Parks, with the Mithun Home Team, cautions that “While we need data and tools to model dynamic conditions, our local partners are such important contributors to the design process. ... There is always someone in the room that understands what is really happening and has ideas on what to do about it. Designing with the community creates projects that are better informed and more meaningful to the people that live there.”^{xv}

Design the financing

Bold vision that requires collaboration among many parties doesn’t typically originate with a conventional client or single funding source. Because of this, the RbD teams were challenged to design a financing strategy as an integral part of the planning and design process. This idea of integrating a community-driven design process with creative financial planning is a strong opportunity area for designers. It is possible that de-coupling early project visioning from conventional development constraints helps to unlock alternative funding ideas and partnerships that enhance community benefit.

Winning support for resilience projects can be difficult, especially given that “success is defined as something that doesn’t happen” explains Shalini Vajjhala, founder and CEO of re:focus. Her advice is to focus first on value capture from

avoided losses by looking for the “biggest losers”—those that lose money if the resilient infrastructure does not get built have an incentive to contribute to funding.^{xvi} Another theme from Shalini and others is that multi-benefit design enables access to diverse funding streams. Laura Tam emphasizes the stacking of financing using different “colors of money” which each have different rates of return.^{xvii}

Finally, given the growing inequality in the Bay area, and the fact that infrastructure investments tend to increase land values, the ripple effect of resilient infrastructure investments needs to be considered carefully. Current development processes tend to concentrate both wealth and poverty, and the SF Bay area is a stark example of this. Dr. Kristina Hill cautions that “systemic racism has left a lot of Black and Latino people at risk of displacement from low-lying areas—and nowhere to move to in the Bay Area. ... The challenge with existing models, such as public benefit districts, is that cities aren’t good at making their districts equal.”^{xviii}

New financing tools are needed to build wealth in communities that are chronically under-invested. Strategies include community land trusts, increased affordable home ownership opportunities, community benefit districts run by nonprofits, local hire provisions, green jobs and local business incubation to spur reinvestment and community wealth building.

Community-driven design process

A truly community-driven design process fundamentally shifts the roles of client and consultant and the relationship between local government and its citizens. Communities become client and collaborating consultant, and local government empowers community groups and residents, rather than setting direction and delivering services unilaterally.

As an example, to produce the Our Home project,^{xix} the Mithun-led Home Team gathered a community advisory board (CAB) to engage in a collaborative process that began by building on the recently completed North Richmond Shoreline Vision,^{xx} as well as listening carefully and exploring opportunities and synergies together through a series of collaborative workshops. Important community benefits

were identified—affordable housing and home ownership opportunities, renewable energy incentives supporting local jobs, tree planting to improve air quality and stormwater, and greywater as a resource for local nurseries, together with places to gather and places to make their history and culture visible. The collaborative design process requires designers to step back and “lead from behind” so community members can actively participate.

While community strength is needed, Amanda Brown-Stevens noted the need for government buy-in so that there is ownership and desire to follow up on projects. Chris Guillard of CMG Landscape Architects and the All Bay Collective team agrees: “Design professionals can catalyze project ideas through research, but inevitably it is community members, local government and the private sector that need to be the project catalyst.”^{xxi}

Conclusion

Visioning the resilient future is an exciting process—and one that leverages naturally appealing ideas. Multi-benefit resilience projects may also provide a pathway to address urgent social justice challenges, with community-driven projects that produce more livable and more affordable communities. While financing and governance challenges are significant, these challenges are opening new opportunities for designers to engage with communities to co-create meaningful projects. Designers need to position themselves as collaborators in an engaged community-driven process, bringing expertise in climate resilience, green infrastructure, finance, community development and facilitation to develop multi-benefit resilience solutions.

Sandy Mendler is an architect, planner, researcher and design industry thought-leader, working with visionary clients to design buildings, campuses and urban neighborhoods that inspire, integrating innovative solutions to urgent climate, resilience and social equity challenges. She is principal with Mithun.

Notes:

- i Urban Land Institute (2015), “Tackling Sea-Level Rise: Best Practices in the San Francisco Bay Area,” <https://sf.uli.org/wp-content/uploads/sites/47/2011/05/Tackling-Sea-Level-Rise1.pdf>
- ii Personal interview with the author.
- iii Ibid.
- iv Ibid.
- v From the Finance Guide for Resilient by Design, Bay Area Challenge Design Teams, Final Version 1.0, December 1, 2017, available at <http://www.resilientbayarea.org/finance-advisory-team>
- vi For information, images and videos describing the nine completed projects for the Resilient by Design, Bay Area Challenge see: <http://www.resilientbayarea.org/projects/>
- vii To access the design brief for the Resilient by Design, Bay Area Challenge, see <http://www.resilientbayarea.org/design-brief/>
- viii Personal interviews with the author.
- ix For information on the Rebuild by Design, Hurricane Sandy Design Competition see: <http://www.rebuildbydesign.org/our-work/sandy-projects>
- x Personal interview with the author.
- xi Ibid.
- xii For more information on the Unlock Alameda Creek project see <http://www.resilientbayarea.org/unlock-alameda-creek/>
- xiii For more information on the Resilient South City project see <http://www.resilientbayarea.org/resilient-south-city/>
- xiv Personal interviews with the author.
- xv Ibid.
- xvi For more information about re:focus partners and their research see: <http://www.refocuspartners.com/library/>
- xvii Personal interview with the author.
- xviii Ibid.
- xix To learn more about the Our Home project see <http://www.resilientbayarea.org/our-home/>
- xx For access to the North Richmond Shoreline Vision, see <http://www.sfestuary.org/wp-content/uploads/2017/06/N.-Richmond-Shoreline-Vision.pdf>
- xxi Personal interview with the author.

FROM SUSTAINABLE,
TO RESILIENT,
TO REGENERATIVE DESIGN



The Impact of Distributed Leadership and Non-traditional Partnerships

There is a new paradigm for today's architects. Traditionally, the problems we solved for clients—in most cases—fit nicely and neatly into the parameters of our job descriptions. But can we do more to make a real, lasting social impact?

ERIC CARBONNIER, EERA BABTIWALE AND BRUCE BOUL

Today, we understand better the sheer complexity of the issues at play when we plan and design buildings, communities and even cities. This requires a new, more open approach: one that suggests that future architects engage with more fields—economics, the environment, and regional, state and national officials so that we may contribute value in ways that transcend our traditional roles.

This paradigm shift is emerging in our firm through an organizational plasticity that combines traditional top-down hierarchy and young leaders driven by a deep social and environmental calling. The emerging leadership may look and feel different across the industry, but the fuel of this subculture taps into the spirit of each employee's personal mission while supporting the organization's stakeholders—not just its shareholders. These leaders are independent but unified. Singular but populous. And, they represent a distributed leadership that is generationally distinctive.

So how did HMC Architects—a financially driven business model—justify utilization rates to drive social and environmental impact that may or may not have anything to do with architecture? We founded the HMC Designing Futures Foundation (DFF) in 2009 as a way to deepen the firm's social and environmental impact. The DFF operates as a private grant-making foundation that has invested more than \$750,000 in its communities locally and globally, and has

sparked community partnerships, inspired employee volunteerism, and driven deep replicable impact all within responsible business practices. Each impact is unscripted and never limited. Outcomes are organic and boundary-less. And they all start with a creative imagination.

In 2012, five HMC employees partnered DFF with Santa Monica Malibu School District's McKinley Elementary School and developed a series of children's interactive workshops to provide a deeper understanding and concern for our planet's natural resources along with fundamental concepts of cause and effect. Dubbed "Sustainable Environments Seen Through the Eyes of Elementary School Children," these workshops focused on how our consumption of energy and water continually impacts our environment. The workshops adopted many common core curriculum science concepts, but we felt it was most important to inform students of the consequences of human behavior on our planet, emphasizing that they have the power to make a positive difference. In addition to the students from McKinley Elementary School, students from Maracaibo, Venezuela joined the workshop via Skype, raising the audience to 300 elementary school students transcending geographic, cultural and social boundaries. The goal was to empower youth to change the direction in which our global environment is heading.

The workshops resulted in a freely distributed creative children's story called *Will the Waste Monster*, which addressed

concepts of our natural environment and how to make a difference. Since launching this project in collaboration with the elementary school, the HMC Architects team has shared the project with a half-dozen school districts throughout California and was honored with the first U.S. Green Building Council (USGBC) Malcolm Lewis Impact Award.

In 2015, a different band of HMC employees successfully secured \$1.9 million dollars in two Drought Response Outreach Program for Schools (DROPS) grants from the California State Water Board for two of the firm's budget strapped Pre-K–12 clients. The grant's objective was to design and implement storm water pollution reduction strategies, water conservation, and to restore, renew, and revitalize local water sheds. Each project examined the integration of multiple low impact development (LID) strategies including bioretention, bioswales, porous surfaces and above-grade cisterns supplying sub-surface water to landscape areas, playfields and raised garden beds. The combined impact resulted in a 31,000 cubic-foot bioretention area; 22,000 square feet of bioswales; two 1,500-gallon cisterns coupled with farm-to-table raised garden beds and an assortment of green screens; and 1,740 square feet of rain gardens that collectively turned the campus into a citizen science outpost.

While the water grants were timely to a state going through water use restrictions, it was vital to leverage a portion of the grant to bolster environmental literacy. HMC and the districts forged new alliances with local non-profit community groups to provide teachers and students with access to high quality environmental education resources and experiences. The California Regional Environmental Education Community (CREEC) Network in collaboration with the Inland Empire WaterKeeper provided future teachers of Clearwater Elementary School access to high quality environmental education resources, including instructions on how to integrate the various campus storm water harvesting strategies into their lesson plans, and water quality testing kits to complement the new outdoor teaching areas. While these impacts have immediate and long-term environmental impacts, other movements are less quantifiable and simply resonate with the need for deep social change.

The Free School of Architecture (FSA) caught DFF's attention because of its unique approach to the delivery of conventional architectural pedagogy. Organized as a 100 percent tuition-free, non-hierarchical, peer-to-peer learning and participant-directed program, the six-week experiment is committed to the free exploration and exchange of ideas in and around architecture. FSA's pulse responds to the unrelenting rise in tuition costs that continues to fracture socioeconomic bridges and limit access to quality architectural education. FSA offers opportunity for honest discussion, experimentation and open-ended dialogue around architecture through workshops, lectures, projects, exhibitions and publication. HMC's DFF partnered with FSA to empower this creative delivery of free thought for these emerging practitioners from all over the world. This year FSA is nestled in Woodbury University's center for experimental exhibitions and multidisciplinary collaborations in Hollywood, California.

"HMC and the districts forged new alliances with local non-profit community groups to provide teachers and students with access to high quality environmental education resources and experiences."

When FSA debuted in 2017, it was recognized by the Metropolitan Museum of Art's symposium called *In Our Time: A Year of Architecture in a Day*, which was devoted to the most exciting and critical spatial projects of 2017. This year FSA reviewed several applications and accepted multiple international candidates. What will come of this experiment? Will it evolve past huddling in various corners of Los Angeles and seek a permanent organizational structure, or would that be contrary to its ephemeral origins?

Sharply different than the social undercurrents of FSA and igniting environmental literacy in elementary schools, our distributed leadership teams partnered with Los Angeles-based ZERO SOUTH. ZERO SOUTH means ZERO fossil fuels to

the South Pole to embark on a 1,200-mile expedition in one of the world's most inhospitable environments. The volunteer-based organization of talented high-tech gear heads and engineers are bound by a common objective to innovate, fabricate and deliver the ultimate "citizen science on steroids" carbon-neutral expedition. Leadership played on the irony in repurposing two gas guzzler Hummers into fossil-fuel free hybrid-electric Polar Travers Vehicles (PTV) which kept the crew busy for six years laboring over the build of the two PTVs. In 2016, ZERO SOUTH started trail drives made possible through a grant from The Roddenberry Foundation and DFF across the North Slope of Alaska from Prudhoe Bay to Barrow along with an Airstream habitat sled nicknamed the SnowStream.

"By casting off the traditional architect's role, looking for non-traditional partnerships and caring less about limitations, we can help clients solve financial challenges."

As the HMC DFF proponent, I was particularly intrigued by the complexities of thermal comfort at -49°C and envelope performance. The Snowstream was reinforced with aerogel thermally enhanced walls and a context-appropriate heating system that used bio-fuel to achieve a sustainable low carbon footprint. While maintaining thermal comfort may appear simple, a deep dive into observing, documenting and recording environmental variables during trail drives was a necessity to prepare for the far greater environmental stresses and thermal shocks of Antarctica.

The trail drive turned into a research experiment deploying dataloggers outside and inside the SnowStream, cataloging temperature, humidity, wind speed, energy use and surveys documenting clothing layers and activity type. The results will be used to develop a thermal comfort energy management approach that optimizes heating fuel consumption relative to environmental conditions and human perfor-

mance. Several more trail drives are anticipated, and each will examine envelope, material performance, thermal bridging and air infiltration to address human survival concerns in the extreme subzero temperatures of Antarctica. While the building scientist questions envelope performance, the partnership reveals unforeseen synergies that extend beyond the initial objective. In 2017 ZERO SOUTH led the 2017 Los Angeles March for Science, and like previous expeditions, are strategizing citizen science opportunities connecting the expedition team to school children 8,000 miles away.

When HMC Architects formed its DFF, it created opportunities for all employees to engage in their own personal mission framed around deep social innovation and environmental impact. As DFF evolved over the years, its social innovation aimed to partner with resilient organizations that catalyze positive change to transform communities while serving the public good, and leverage impact through employee volunteerism or pro bono design services. A distributed leadership framework emerged to employees willing to take on the accountability to be a proponent and leader unshackled from company budgets, profitability, and utilization rates that limit such creative movements. Since 2010, individual employees or teams of employees have coupled with 50 different organizations exploring opportunities to make a difference in the communities HMC serves.

By casting off the traditional architect's role, looking for non-traditional partnerships and caring less about limitations, we can help clients solve financial challenges. We can educate kids. And we can combat the forces that commoditize architects. In a culture of open sharing, these are lessons from which we can all benefit.

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Made to Fit: Procurement at World Bank

The World Bank provides financial and technical assistance to reduce poverty and build shared prosperity in developing countries. Commitment to sustainability and the environment is a cornerstone of all the Bank's work. DesignIntelligence recently sat down with Enzo de Laurentiis, Chief Procurement Officer for World Bank, to talk about how sustainability underpins the Bank's new procurement strategy.

DESIGNINTELLIGENCE

DesignIntelligence (DI): How is the procurement policy at the Bank different now than in the past?

Enzo de Laurentiis (DL): We now have a significantly modernized procurement policy. The new framework, which became effective July 1, 2016, was developed through a three-year process that involved extensive global consultations, including several engagements with our Board of Executive Directors. In a nutshell, we moved from a one-size-fits-all to a fit-for-purpose approach, which allows us to adapt our procurement strategy to the unique characteristics of operating environments. Some of these characteristics include the country, capacity, and local environment, the market dynamics, and, of course, the specific development objectives that we want to achieve with our projects.

This new framework is much more flexible and modern. It supports and helps to implement broader sets of policies, rather than one narrow objective. That way, it becomes a strategic tool to achieve economic, technological, social and environmental goals.

Rather than the old approach, where contracts were awarded to the lowest evaluated tender, we have moved to awarding the most advantageous proposal, which insures that value for money is the key driver, and the balance between quality and

cost is right. So, we are looking at all aspects of life-cycle costs, quality, and sustainability considerations. We are now linking procurement directly to the development objectives. This also results in a much more proactive engagement with the market.

DI: It seems there are a lot of benefits to this new procurement framework. What were the reasons for the change? What made you dissatisfied with the way things were done before?

DL: The World Bank's previous procurement policy served us very well for a long time. In fact, it has been long considered the standard in the development community. But as public procurement matured into a strategic policy tool in an environment of globalization and rapid information exchange, there was a real need to modernize our policy.

The evolution of procurement at the World Bank mirrors new government and market realities, and the current framework is intended as a catalyst for further change, driving new ways of thinking and working to deliver improved development outcomes in our projects and supporting the sustainable development goals.

DI: In what ways does the new procurement approach help accomplish the mission of the bank?

DL: Effective procurement is key to successful development outcomes. The new procurement approach is designed in a way to help countries achieve high quality, sustainable and innovative development results. For example, our fit-for-purpose approach is the driving principle that allows us to tailor our strategies. We do in-depth analyses of all risks and opportunities in a country's own environment. A key objective is to attract in the relevant market the right bidders with the right incentive and the right strategy, therefore getting better value for countries.

In lower-capacity or fragile countries, we can support these countries better and help them attract bidders. For example, we launched a three-year pilot whereby the Bank mandates direct payment to bidders, as part of a broader effort to foster competition in particularly difficult environments. We also work with countries to provide hands-on support. In addition, we manage risks more proactively and comprehensively, because the risks in those countries are different.

Likewise, for countries with more sophisticated systems, this framework allows us to adapt to their needs and environment, too. It helps us to align with the modern practices and provide more cutting-edge solutions.

“The evolution of procurement at the World Bank mirrors new government and market realities, and the current framework is intended as a catalyst for further change, driving new ways of thinking and working to deliver improved development outcomes in our projects and supporting the sustainable development goals.”

DI: Sustainability is a strategic objective for the World Bank. How is sustainability addressed by the Bank's new procurement approach?

DL: First, sustainability underpins all of our work at the World Bank. There are many different aspects of it—too many to list here. We have a very broad agenda that supports sustainable development goals. As you know, several of those deal directly with sustainability from climate action, to improved natural resources management, to broader coverage of social aspects, just to mention a few.

We will soon launch a new Environmental and Social Framework, a major reform of our environmental and social safeguard policies. The ESF contains standards that will help us support environmental and social sustainability, including as it pertains to addressing climate change mitigation and adaptation. The ESF will also help us support the sustainable development goals of all countries.

When we developed the procurement framework, we wanted to make sure that we were supporting the broader sustainability agenda that touches everything that we are doing from the ground up. Sustainability is intrinsically related to value for money because it is critical to deliver the right results while also protecting the environment and the communities we serve.

DI: Are there any particular examples or success stories that you can point to?

DL: Right now, we are in the second year of the new policy, and the projects using it are just now beginning to procure. It's still a little early to give data and assessments of those projects, but we are seeing new methods and new approaches being used. We're seeing discussions on resource efficiency and on using different options to ensure that sustainability is being taken into account. And we're also seeing a very good response from the market.

That said, the Bank is doing projects in every region of the world that support greener development. One example is a solar project in Morocco, which will become one of the largest solar power plants in the world. This project underlines the country's determination to reduce dependency on fossil fuels. Procurement strategies support the delivery of these objectives with value for money and integrity. But we certainly have a

rich portfolio of projects that support these objectives. In fact, as I said, almost everything we do from ground-up focuses on supporting the sustainable development goals.

DI: You've referred to both environmental and social aspects of sustainability. From the procurement perspective, what are some specifics within these aspects that you're looking to change?

DL: One very concrete example of how sustainability is incorporated in procurement processes is the way we now manage risks in all aspects of environmental, social, health, and safety requirements. For example, we proactively manage risk related to gender-based violence and sexual exploitation in projects with a physical work site. All our works-related bidding documents have been significantly enhanced. We use these procedures in a way that helps protect the environment and the communities that we serve. We are also in the process of revising other standard bidding documents to further reflect sustainability requirements, as appropriate, and update procurement guidance to ensure seamless coordination with relevant aspects of the Environmental and Social Framework.

In terms of the environment, it means to first discuss with our clients the objectives of the project and develop a procurement strategy that directly supports them. It can mean, for example, including some type of eco-labeling and specifications that ensure a certain sustainability, and the possibility of using rated criteria in evaluation, as described in the Request for Proposals for a specific procurement. These, and other options in the Framework, allow us to review and compare the proposals also from a qualitative point of view, and some of the criteria can address sustainability aspects.

Another example is energy efficiency throughout the life-cycle costs. We also use value engineering, which is the ability to improve certain aspects of the methodology and performance, using different materials, or reducing cost while maintaining basic function.

There are many ways throughout the whole procurement process, from planning through contract implementation, where we can help achieve desired objectives specific to the project.

DI: The World Bank works in so many diverse environments. What are some challenges you face in different regions or countries relating to the new procurement framework and supporting sustainability within that?

DL: The main challenge is the different level of capacity of our clients. The lower the capacity, the more support we need to provide. As I mentioned, we focus even more attention and resources on projects in riskier environments. When appropriate, we help clients and do hands-on parts of procurement. We sometimes add more technical assistance and more direct support. In some cases, the fragility is very serious. There are conflicts in some areas and additional complexities come with that. We have a lot of guidance for countries and staff on how to deal with these specific aspects.

DI: What positive effect do you think the new procurement approach will have on the places where you're working?

DL: First, creating an enabling environment for business. That means more competition; more and better bidders. These higher-quality bidders are interested in participating, because they feel that there is a leveled playing field, that their added value is taken into account, and, of course, that transparency and integrity are enhanced. It makes for a much better environment for business.

Second, complemented by technical assistance and policy dialogue, the procurement framework can build and develop the capacity of our clients with a footprint that is much larger than our projects.

A third positive is better value, ultimately, for the people of the world. The new procurement framework ties directly to our ultimate objectives of reducing poverty and increasing shared prosperity.

DI: In choosing different projects to work on, are there certain strategic priorities that the Bank follows?

DL: The Bank supports projects in almost every sector of the economy. Every country has its own development strategy.

The Bank partners with countries to help develop and implement these strategies. (We call them country partnership frameworks.) They are renegotiated with every political cycle to agree on the right match between the policy objectives and the development priorities. A lot of studies and analytics provide the basis for these documents and determine the right projects. For example, water is very, very important. Energy is also very important, and so is infrastructure, education, and health, among various other sectors. Each country considers the right balance and agrees with the Bank on strategy that forms the basis of projects.

DI: What should we take away from this discussion about procurement?

DL: To me, the most important thing is that the Bank's new procurement framework is a paradigm change from the past. The new approach focuses on value for money, which means it results in the most advantageous proposal: the balance, the quality, the cost and sustainability. Procurement can support sustainability because of this critical fit-for-purpose aspect. We are able to support all our clients and income segments, with a special focus on those countries that are the most fragile and have capacity challenges.

This also places a premium on partnerships and collaboration, including with the private sector. We engage with the private sector very early during project preparation and carry out market assessments and analysis that helps us develop the right strategy to target the right bidders from the relevant market. All of this is done not only to deliver results on the project but also to build capacity beyond our projects. We work closely with multilateral banks and other development partners as well.

“Procurement is a key tool in supporting social and environmental objectives and protecting communities and the environment. There are many important benefits of this new framework to support these goals and our projects’ specific development objectives.”

Again, procurement is a key tool in supporting social and environmental objectives and protecting communities and the environment. There are many important benefits of this new framework to support these goals and our projects’ specific development objectives.

About the World Bank

Established in 1944, the World Bank Group is headquartered in Washington, D.C. The World Bank is a vital source of financial and technical assistance to developing countries around the world. The Bank provides low-interest loans, zero to low-interest credits, and grants to developing countries. These support a wide array of investments in such areas as education, health, public administration, infrastructure, financial and private sector development, agriculture, and environmental and natural resource management.

Enzo de Laurentiis is the World Bank’s Chief Procurement Officer, in the Operations Policy and Country Services Vice-Presidency.

The Price of Water

Water is the incredible common thread that connects our communities via food, power, manufacturing, environment and ultimately our health.

CINDY WALLIS-LAGE

In a vast majority of the United States, we are fortunate to be able to access water easily for our home and business needs. Reliable access to potable water is so integrated into our lives that the quality and availability are taken for granted and the complexity of our water infrastructure is rarely considered until a community experiences a water crisis. But, across the nation, we have reached a point where much of our most critical infrastructure is old, frail and unable to keep up with changing water needs. One could argue that the industry has done such a good job of hiding the water infrastructure and delivering service to customers that people seldom see or think about how water impacts their community and their quality of life—until pressed to spend on updating infrastructure.

“As more communities consider reuse, monitoring the quality of water is a key concern. Fortunately, technology is providing greater instrumentation and analytics solutions to detect anomalies and help utilities proactively manage operations.”

Water’s cost tends to be misunderstood. Right now, the “price” consumers pay for water is much less than that for other “essential” items we feel we must have, such as cellphones and computers. Sure, we use these devices, and when they are misplaced or broken, we feel lost without them. But ultimately, we can function without the conveniences they bring us. The same is not true for our most basic need—water.

The challenge is that as an industry we haven’t effectively communicated the need for investment to our partners in government and the public at large. Because we take water for granted (the taps flow and the toilets flush) our conversation has centered on the wrong priorities. We need to focus on the value of reliable water infrastructure as it relates to quality of life, economic prosperity and community growth. An investment in water infrastructure drives our ability to deliver more efficient, more reliable service by harnessing technology to help communities prepare for more extreme operating conditions, driven in part by climate change and evolving population demographics. Instead, much energy has gone to avoiding rate increases and efforts to simply do more with less. This is an approach, however, that leads to a lack of necessary investment and unwanted consequences of poor performance, community inconvenience and potentially adverse impacts to human health or the environment.

With the impact of climate change affecting more of our population, from dense coastal communities to booming, historically water scarce regions, it is becoming harder to overcome such stresses and strains. We need to examine what we expect from our water infrastructure as many of our systems weren’t designed for the range of operation that they are now forced to handle.

Texas highlights the push-pull many communities feel: For several years, many parts of the state experienced significant drought conditions, and its effects were damaging to communities. Cities that lost their water supply essentially shut down. People who had once enjoyed a good quality of life walked

away from their homes. Industries, once at the core of the community in terms of jobs, economic growth and community benefit, shifted locations or closed their doors. A year later, some of these same communities experienced significant flooding and needed to manage massive amounts of water. These two events, though at opposite ends of the spectrum, tested Texas' system resilience and offer a glimpse of the challenges facing thousands of service providers.

So how can we work to educate the public and advance the cause of water infrastructure?

Holistic and collaborative solutions are key to maximizing the benefits of every drop of water. Different utilities often have competing objectives for their water management systems. We need to prioritize systems of collaboration to integrate planning more effectively. Northern Kentucky's Sanitation District One has instituted a collaborative effort to manage their water system on a watershed basis versus siloed decisions which has driven investments in green infrastructure to enhance the system's resilience. Los Angeles, faced with growing scarcity concerns like much of the Southwest, has developed its One Water L.A. program. Today, the water and wastewater utilities are working together in a partnership to maximize water reuse, groundwater recharge and stormwater management. These are just a few examples of how expanding the conversation around holistic water planning can improve public support for investment.

Embracing technology will also play a key role in demonstrating the effectiveness of water infrastructure investments. I believe an increased confidence in quality will ultimately drive opportunities for potable reuse – pipe-to-pipe solutions where treated, high quality, used water equal to a potable water supply directly feeds to customers from an advanced treatment facility water supply. Windhoek, Namibia, was the first to implement this type of system out of necessity; Texas was very close to potable reuse during their extreme drought, and now California is working to get legislation in place to allow it.

As more communities consider reuse, monitoring the quality of water is a key concern. Fortunately, technology is providing

greater instrumentation and analytics solutions to detect anomalies and help utilities proactively manage operations. Sensors provide data in real time which allows for more nimble responses and rapid decision making. The combination of real time data and high-level analytics provides increased predictability of quality which in turn leads to greater confidence in water quality for the consumer.

Data is also key in analyzing the quality and performance of water system assets. It can provide greater insight on when an asset will need maintenance, providing greater cost control and less system disruption. Leaks, a major source of lost revenue and inefficiency, can be detected more rapidly. Metering systems can become more effective, providing instantaneous understanding of the system from the source to the household level, saving significant amounts of water and lowering unit costs.

“Water is priceless because there is no substitute—and water infrastructure has a price that we must pay in order to provide the certainty and reliability in both water quality and quantity that our communities require.”

New technologies, or improvements to decades old practices, are also allowing for increased optimization of energy. Energy is one of the largest operating costs for water and wastewater utilities due to the significant amount of pumping required to move water in the collection and distribution systems as well as through the plant. In addition to pumping, wastewater facilities require significant energy for treatment. Fortunately, the organic waste that comes into a wastewater treatment plant has a tremendous energy content. When that energy can be captured and reused in the plant in the form of gas, it can offset its impact on the power grid, lowering operating costs. The gas generated from the organic waste can potentially fuel onsite engines that provide power to the plant, which allows the facility to achieve—or at least move closer to—net-zero energy impact.

When discussing water infrastructure, the challenges faced by the people of Flint, Michigan, remain top of mind within the industry. Flint has forced more communities to actively examine their water pipelines and take a more aggressive approach to pipe replacement and remediation because of the high levels of concerns regarding water quality. When overlooked, or taken for granted, neglect of any part of our water infrastructure can result in widespread devastation, much of which is avoidable given the advances our industry has made.

I am confident that as we shift the conversation to the importance of investing in water infrastructure for what it brings

communities, we can elevate its value in the eyes of key stakeholders. Water is priceless because there is no substitute—and water infrastructure has a price that we must pay in order to provide the certainty and reliability in both water quality and quantity that our communities require. We must make the investment now to meet the challenges of today's aging infrastructure and provide the resilience required to meet the needs of future generations.

Cindy Wallis-Lage is President, Water Business of Black & Veatch.

PERSPECTIVES

Part of the Solution: Defeating Climate Change

Architecture 2030 is working to transform the built environment from being a major contributor of greenhouse gas (GHG) emissions to being a central part of the solution to the climate crisis. DesignIntelligence's Bob Fisher talked with Architecture 2030's Founder and CEO Ed Mazria and COO Vincent Martinez about Architecture 2030's past, present and future.

DESIGNINTELLIGENCE

DesignIntelligence (DI): How has Architecture 2030 evolved from when it was founded until now?

Ed Mazria (EM): We formed Architecture 2030 when we discovered that the building sector was a large part of the emissions problem that was fueling climate change. Our goal was to address the issue within the professions and building sector community. Over the years, our mission has remained the same, but it has grown broader in terms of issues and more focused in terms of solutions.

The scientific community has set a 2°C limit to keep the world from hitting the tipping point of catastrophic warming. To meet that target, we must phase out all fossil fuel CO₂ emissions by the year 2050. However, during that same period, we're expected to double the entire world's building floor area. Given this, we must immediately design all new buildings to a zero-net-carbon standard so that they are not adding to the emissions problem, and we can begin to bend the curve down. Today, at Architecture 2030, one of our primary focuses is the ZERO Code, a national and international building energy code standard that we recently developed and issued, which results in zero-net-carbon buildings.

To address the embodied carbon of this new construction, Architecture 2030 also has a new program called the Carbon Smart Materials Palette, which will allow designers to specify

products, like concrete and steel, that have a reduction in embodied carbon.

Along with these two areas of focus, we're also looking at the resiliency of the building sector—in particular, how it can weather the existing and projected climate changes that we are facing now and will continue to face in the future.

“One of our primary focuses is the ZERO Code, a national and international building energy code standard that we recently developed and issued, which results in zero-net-carbon buildings.”

Vincent Martinez (VM): Architecture 2030 began with a focus on the design community and on new construction, which we continue to do. But we also recognize that in thirty years, two thirds of our existing buildings will need to be renovated.

One transition we've made over the years is expanding our focus to cover the entire building sector, taking a more holistic approach to its decarbonization.

Another transition is that our networks have changed, shifted and grown to include real estate professionals involved with existing buildings, as well as city networks. We're also moving from more of a private-sector led initiative to a public policy perspective.

We've also remained true to our objective of keeping things accessible. The ZERO Code and the 2030 Challenge are conceptually straightforward and the framework is easy to understand.

DI: What programs or degree of involvement do you have with the owner, developer and investor community?

VM: We have a program that we started in 2009 called 2030 Districts. These are private/public partnerships led by owners, managers, developers and investors with local governments and stakeholders in the community. The districts are designated urban areas across North America that are committed to reducing energy and water use, as well as transportation emissions.

2030 Districts were originally overseen by Architecture 2030 but are now part of an independent 2030 Districts Network. They are collaborative in their efforts to renovate millions of square feet of existing buildings and to construct high-performance buildings in their districts. This initiative is providing a business model for sustainability by sharing resources, leveraging financing, and collaboration across all people and groups involved.

It's a very successful model because the districts have room to grow and operate with autonomy. They understand their own communities, local governments and businesses, and by running the district themselves, they can meet the reduction goals.

EM: One thing Architecture 2030 does well is that we address issues in the built environment that are either impacted by or impact climate change. We collaborate and create programs and initiatives that are then taken up by the people we collaborate with. As the ownership shifts and sits with them, the program grows and becomes more robust. It transitions to a network of like-minded organizations. In this way, we can

retain a small and highly skilled staff that networks with thousands of colleagues that take ownership of and implement initiatives and programs.

DI: With all of the climate-based challenges we're up against, why is it that codes seemed like the right area of focus in order to accelerate our progress?

"Architecture 2030 began with a focus on the design community and on new construction, which we continue to do. But we also recognize that in thirty years, two thirds of our existing buildings will need to be renovated."

EM: If you look at a graph of energy consumption and emissions in the U.S. building sector, you will see that they increased year after year until 2005, the year we issued the 2030 Challenge. At that time, we were working with various governments, and building sector professionals and organizations. They all understood the issue and began to address it through planning and building design, and by implementing more stringent building energy codes.

By 2006, energy consumption and emissions peaked, and it has been flat ever since. Even though we've added millions of square feet of buildings in the U.S., total energy consumption and emissions have not been rising in the sector. The reason is we were also renovating our existing building stock to be more energy efficient.

The problem now is that over the last decade, while our building sector energy consumption and emissions have been flat, we are not bending that curve down.

So, we've shifted our focus to urban areas where most of the growth is taking place. At this time, all new buildings must be designed zero-net-carbon. Due to the urgency of this issue, the most impactful and large-scale means of achieving that is through zero-net-carbon (ZNC) building codes.

DI: Was the public sector where you felt you could get the scale you needed?

EM: When we talk about a building code, it affects all buildings being built or renovated in a jurisdiction. In that sense, the scale factor increases dramatically. If you have a ZNC code in place, then you're almost guaranteed not to add to the building sector emissions problem in that jurisdiction. But we must simultaneously take the next step, which is to increase the energy efficiency renovations of existing buildings. That is best accomplished through policy.

VM: We were involved as a lead research partner for the World Green Building Council on their Advancing Net Zero Initiative. In that work, we discussed a theory of change, that the private sector should first demonstrate that ZNC is feasible. Once that is accomplished, governments can feel confident requiring it by code.

Businesses are heavily involved in the movement toward ZNC because they're willing to take on new cutting-edge initiatives and technologies. In the last 10 or 12 years, we've seen buildings in all climates reaching ZNC. From a code standard perspective, we've illustrated that it can be done cost effectively in all climates and in all building types. Now we must scale to expand ZNC nationally and globally.

EM: In essence, the latest code standards are either meeting or are very close to meeting the 2030 Challenge targets. The private sector has led the way in demonstrating the feasibility of getting to ZNC.

DI: What are the major objections and obstacles with this new direction?

VM: There is the question between energy efficiency vs. decarbonization. Over the last 30–40 years, we've advocated for energy efficiency for good reasons—cost effectiveness, environmental benefits, carbon reduction benefits and more. Now we're reaching the point where code standards are squeezing out the last drops of energy efficiency in building operations. The question we must confront now is this: Is it carbon- or

time-effective to focus only on efficiency? Given that we are facing the urgency of carbon reductions, we're expanding our focus to include the source of the energy and are developing strategies, codes and programs that incorporate on-site and/or off-site renewable energy in building operations.

We always address efficiency, but efficiency in and of itself will not get us to zero carbon. At this point, buildings must operate with 100 percent renewable energy.

The other obstacle we see is a lack of bold government leadership. Many governments worldwide have made a commitment to the Paris Agreement, which means phasing out fossil fuel emissions by 2050. While they've made the commitment, many do not have adequate plans in place to meet the commitment. They're currently focusing on individual actions when what we really need is phased comprehensive plans and policies.

Our role is to advance solutions and roadmaps for comprehensive building sector emissions reductions that have community and political buy-in.

“We address issues in the built environment that are either impacted by or impact climate change. We collaborate and create programs and initiatives that are then taken up by the people we collaborate with. As the ownership shifts and sits with them, the program grows and becomes more robust. It transitions to a network of like-minded organizations.”

EM: There are numerous cities, states, provinces and countries that have made commitments of 80 percent emissions reduction citywide by 2050 or zero by 2050. The question is, how do they accomplish it? Architecture 2030 is working with a group of 11 cities to develop credible plans to meet their 80 by 50 or zero by 50 targets. Once we've completed the plans, we will publish a flexible roadmap that can be used worldwide.

DI: Is Architecture 2030 involved in trying to shape or make the case for the economic side of doing the right thing?

EM: Many times, I'll hear a similar question to the effect of, "My client is worried about costs, so it's difficult to design a building that meets the 2030 Challenge target." But as designers, if we truly understand the concepts behind passive and low energy/emissions design—i.e., building shape and size, orientation and glazing, day lighting, natural ventilation, shading, passive solar heating and cooling strategies—we can design highly efficient buildings at little or no additional cost. All of these concepts must be part of a designer's palette.

Secondly, the ZERO Code we recently issued is a zero-net-carbon building energy standard that incorporates ASHRAE 90.1 2016 prescriptive and performance requirements coupled with on-site production and/or off-site procurement of renewable energy. ASHRAE 90.1's prescriptive efficiency requirements have been determined to be cost effective. So, the ZERO Code requires cost effective efficiency measures that ensure compliant high performance ZNC buildings.

"By 2006, energy consumption and emissions peaked, and it has been flat ever since. Even though we've added millions of square feet of buildings in the U.S., total energy consumption and emissions have not been rising in the sector. The reason is we were also renovating our existing building stock to be more energy efficient."

VM: The ZERO Code is exceptional because it removes cost and "meeting targets" as potential issues between architects, engineers and clients.

Also, the cost of utility renewables is about equal to fossil fuels in most areas. Furthermore, if you buy a power purchase agreement (PPA), there will be consistent energy rates for the

long term and an owner isn't subject to the volatility of the fossil fuel market.

For existing buildings, we're currently consulting with cities regarding the timing of building upgrades. If a building energy upgrade is undertaken at the time of a capital improvement cycle, the costs are much lower compared to an energy upgrade undertaken outside that cycle.

EM: The building sector and media have been mainly focused on zero-net-energy (ZNE) buildings, and while that would be ideal, it unfortunately is not feasible for many building types in urban locations. Over the next 40 years, worldwide population growth and development is expected to take place mostly in urban areas where it is difficult, and in most cases impossible, to design and construct to ZNE standards due to the limited roof and site area for renewable energy production. Designing to zero-net-carbon or ZNC eliminates that problem since a building can also procure the off-site renewable energy it needs to operate.

DI: What part is Architecture 2030 playing in the education of young practitioners?

EM: We have found that in professional degree programs, there are many courses that focus on energy and emissions outside of design studios. That creates a disconnect between understanding the issues and designing to address the issues. Unless energy, emissions and now adaptation and resilience are a focus in design studio, they do not have the necessary importance or "significance" that is critical in this age of climate change.

Recognizing that disconnect, this past year we worked with the AIA Committee on the Environment (COTE) and the Association of Collegiate Schools of Architecture (ACSA) to expand the COTE Top Ten for Students design competition and named it INNOVATION 2030. This "design and ideas" studio competition meaningfully addressed the causes of climate change and its future impacts. The competition recognized innovative and exemplary designs that satisfied three primary objectives: energy and emissions, adaptation, and resilience.

Because of the competition's success, the AIA Committee on the Environment will continue to offer it in subsequent years. Architecture 2030 will play a supporting and collaborative role. This is an example of how Architecture 2030 works: we identify and address an issue, create a program, and collaborate with organizations, firms and governments that have the bandwidth to implement it.

Professional education is also critical. We have recently completed the highly successful AIA+2030 Online Series, a program that addresses everything in ZNC building design from the design process to setting targets, passive design strategies, energy efficient equipment, renewable energy integration, building commissioning and more. We've also expanded the 2030 Palette, a free online platform that succinctly puts the principles and actions behind Zero Net Carbon and resilient built environments at the fingertips of designers, planners, and builders worldwide. The sustainable planning and design strategies address all scales—from regional planning issues to building details. It is now available in Chinese and Spanish.

DI: What does the future look like for Architecture 2030?

EM: Because we've built a global network of colleagues and organizations our outlook is optimistic. Given that we are heading into an era of climate change, our role will continue to be to identify issues and address them with collaborative models that incorporate highly impactful strategies and solutions. We must phase out all carbon emissions in the built environment by 2050. Along that road there will be many issues to address.

VM: The next few years will be critical. We know that more and more jurisdictions, professionals and national governments will look to address the issues we discussed. We're providing the pathways, strategies and solutions for them to do just that.

Edward Mazria is the founder and CEO of Architecture 2030.

Vincent Martinez is the COO of Architecture 2030.

Sustainability Beyond Practice

There is a dichotomy when it comes to the relationship between architects and the framework for policy and the building codes and standards within which we work. In one camp, design professionals have a view of this framework as “other”—as something created and established by separate entities and organizations and that we must abide by without the ability to influence.

ANICA LANDRENEAU

In that camp, architects either decry codes as “the minimum” that don’t go far enough, it’s the worst building allowed by law, or they rail against codes that aren’t flexible enough, don’t allow creative solutions, or that seem draconian, arbitrary or subject to the capricious whims of enforcement officials. But in the other camp, architects have the same compulsion to drive change, to make improvements, to constantly reshape codes that we also experience in their relationship to the built environment.

Given the nature of architects, it is actually perplexing that this latter group of meddlers in policy, codes and standards is in the minority. The AIA has recently increased its efforts to seat architects on the various committees for the current code cycle of International Codes Council (ICC) and architects now comprise fourteen percent of total committee representation—and this is one of the highest years of participation. Why is it that some design professionals feel the need to design and shape everything around us—the environments in which we live—but not the very regulatory framework in which we are allowed to build?

We are looking at a present in which we are already experiencing some very significant changes to our climate and our environment, and there is no doubt that any architecture (of the future as well as existing building stock) will have to address resiliency and adaptation as much as mitigation, but our codes aren’t catching up with what our profession

already knows. Of course, we’re not obligated to build *only* to the code, and many would argue that our standard of care should *exceed* the code, but do we have a professional and ethical obligation to actually engage in the codes and policy process, to push the codes forward in continuous and more rapid improvement?

The First Engagement Is Local Engagement

Codes and policy can be influenced on multiple levels. At the local level (city, district, county, state), model codes can be modified, expanded and incentivized with aggressive standards and stretch goals. There are boards, commissions, industry advisory committees, technical committees, public hearings and public comment periods during the adoption process. Many industry advocacy organizations (for design professionals, developers, contractors, property managers, owners, etc.) aggregate stakeholder comments and submit them during open comment periods, but these are open to individual comments as well. Local codes and policies are the easiest place to get engaged, because design professionals know their own communities and climate, and they know the challenges, constraints and natural hazards as well as the vision that may be set for future resiliency and climate neutrality.

For example, in Washington, DC, members of the architecture and development community advocated for the landmark Green Building Act in 2006, requiring LEED certification for

both public and private sector buildings. I became engaged in local policy, codes and standards by supporting the District in its implementation of the Green Building Act starting in 2008, then by joining a multi-disciplinary technical committee—including architects—who adapted the International Green Construction Code (IgCC, 2012), leading DC to be the first jurisdiction to adopt it as mandatory for both public and private sector projects in 2014. In 2017, I joined a similar technical committee to review and facilitate adoption of IgCC 2015 and write a new energy code for the District (based on ASHRAE 90.1-2013 and Chapter 7 of 189.1), with the inclusion of an Appendix Z Net Zero Energy stretch code.

Engagement and advocacy can start with simply reviewing proposed draft code changes and providing positive feedback and endorsement, which is even more critical than negative feedback. Sometimes significant or dramatic changes to codes or policy require advocacy which may mean contacting council members, forming advisory committees or participating in hearings. For example, in 2007 Montgomery County, MD, passed legislation requiring LEED certification for public and private sector construction. In 2008 Ralph Bennett, FAIA, developed a course for the University of Maryland School of Architecture, “Measuring Sustainability,” that taught students to explore various sustainability codes and standards. When Montgomery County decided to explore the adoption of IgCC 2012 (with local adaptation), Ralph Bennett’s class supported the county’s efforts by evaluating two levels of stringency of the code for the county to consider. Between 2014 and 2017 stakeholders in the design and development community advocated for adoption of IgCC with an alternative compliance path (ACP) that continued to recognize LEED in lieu of IgCC as it was already recognized in the Federal and commercial marketplace in the region. Advocates participated in individual and group comments, public hearings and other activities, and influenced Montgomery County to adopt IgCC 2012 in September 2017 with the LEED ACP. Local stakeholders continue to remain engaged in the financial incentive updates for the county.

Local advocacy also helps to remove barriers or perceived restrictions within the code. Amanda Tullos, AIA, wrote an appendix to the City of Houston construction codes to clarify

the reuse of materials beyond finishes and to help expand opportunities for use of salvaged structural members while reducing barriers to permitting.

Michael Malinowski, FAIA, advocated specifically for changes to the permitting process by convening a group of regional code officials and design professionals once a year to share issues, concerns, ideas and challenges across the many jurisdictions of northern California. This effort evolved into PASS (Prequalified Architectural Submittal System) now in use by eighteen different jurisdictions to increase efficiency by streamlining the permitting process.

“The rapidly changing needs of our society that require the advocacy and leadership of the architectural community now more than ever.”

In the City of Atlanta, Ryan Taylor, AIA, worked with local advocates Robert Reed from Southface Energy Institute and Ted Miltiades from the Georgia Department of Community Affairs to facilitate a zoning ordinance tweak and adoption of a building code amendment that allows tiny houses. Tiny houses are limited to 400sf, though accessory dwelling units in Atlanta may be up to 750sf. ADUs located near transit, education and work centers may help increase density without substantially changing the character of a neighborhood. The rental income from an ADU may also allow a family to buy a property that would otherwise have been out of reach—for the buyer and renter of the ADU.

But There Is a Need to Engage Further at a Broader National Level

Historically, architects who are passionate about improving the codes have led significant changes. In the 1970s, the AIA formed a Blue Ribbon Panel to explore the future direction of codes. The recommendations for “One Code” led to a common code format, and the terms that came out of that exercise are what helped lead to the ICC and a suite of codes that are used across the U.S. and internationally today.

At the national level, ICC model codes are updated every three years through a technical committee development, public comment, hearing and voting process. Anyone can apply to join a committee and anyone can attend and speak at hearings as well as participate in the creation of or debate on the public comments. Everyone is permitted and encouraged to participate in hearings, and the eligible voting members are encouraged to vote on final versions of the codes. Not all proposed code changes are adopted; in fact, the majority are not. In some ways, it may be good that our codes don't change too dramatically every three years, but in other ways, this stagnation or reluctance to change may be a signal that we need greater advocacy for the changes that matter.

Advocacy and code activism undertaken by architects like David Collins, FAIA, occasionally lead to the development of entirely new codes that address a particular need that isn't adequately met within the existing ICC framework. Examples such as the International Existing Building Code (IEBC) and the International Green Construction Code (IGCC), or important change codes that more accurately reflect the changing needs of our society, allow for Live/Work facilities, enable gender neutral restrooms for more equitable design, and more.

Advocacy Is a Function of Design and a Functional Role of Designers

Code and policy advocacy are inherently a lifelong professional commitment and responsibility. I remain locally involved in Washington, DC, by serving on the Mayor's Green Building Advisory Council and code committees. I have become nationally involved by joining the AIA's Codes and Standards Committee, AIA Blue Ribbon Panel on Codes and the International Energy Conservation Code Development Committee. Getting and staying engaged is a drum I beat daily to colleagues and peers.

The rapidly changing needs of our society require the advocacy and leadership of the architectural community now more than ever. We need to build a culture of engagement that starts in design education with the understanding of how codes are created and continues with the expectation that

part of our professional path occurs outside the studio with participation in code development and advocacy.

We have an obligation as designers and as professionals who respond to and shape our environment, to leverage our knowledge, our experience, our talent and our skills to shape the policy and code framework within which we build our communities. It takes several years for new ideas to germinate within technical committees, to withstand public comments and hearings, and to endure through a voting process that favors little change. And once a model code is formalized, it still takes years to be adopted by states or local jurisdictions, and when adopted it may be adapted or weakened.

We are staring at the headlights of a rapidly changing climate that is bearing down on us, and we need to be planning for our changing environment *today*, not to mention the future. Natural disaster is our new normal. Are codes the minimum? Yes. But that minimum should be continuously improved and elevated to address our changing relationship with the environment, including mitigation and adaptation, resiliency, human health and well-being, equity and social responsibility. We need the participation and advocacy of architects who are passionate about raising the bar with the sense of urgency that the issue deserves.

What is the architect's standard of care? If codes aren't meeting our definition and *aspirational* goals for public health, safety and welfare, then we should exercise the same passion and commitment to influence the regulatory environment that we do the built environment.

Contact information to get involved in code advocacy through the AIA: codes@aia.org; www.aia.org/codes

Anica Landreneau is a senior principal and sustainable design director at HOK. She is a member of the firm's board of directors and design board. Anica works to make Washington, D.C., one of the world's greenest cities by supporting the District in green building policy development and implementation.

The Practice of Governing: An Interview with Dan Watch

Architects, engineers and designers are stepping outside of the bounds of traditional practice to make a difference in our communities and our environment. DesignIntelligence talked with Dan Watch—principal, science and technology practice leader of Perkins+Will, Atlanta—who was dissatisfied with the direction of politics in the U.S. He decided to run for a city council seat in Norcross, Georgia, where he and his family live. Norcross is in the metropolitan Atlanta area, and has an estimated population of 16,845 (2017) and occupies 4.64 square miles. Dan was elected to the council in November 2017, and sworn in on January 2, 2018 for a two-year term.

DESIGNINTELLIGENCE

DesignIntelligence (DI): What inspired you to run for a position on the council of a small city?

Dan Watch (DW): I was and am not happy with the politics in this country. Instead of complaining, I am trying to do something positive about it (in a very small way).

DI: How would you describe the role of a councilperson?

DW: I think the person needs to be a leader, be able to make smart business decisions and be passionate about the city they represent. It is also very important to listen to all citizens, share information, collaborate and do our best to clearly communicate. We are public servants.

DI: What has the experience been like so far?

DW: Challenging. Working for a private company for 24 years that has been very successful being innovative and always thinking out of the box is much different than working within

government where protocols and process are very cumbersome. The most difficult problem the government has is the obstacles and processes set up by the government. In private industry if there is an issue or idea, we simply gather the right people around the table, and we discuss and determine within an hour what we are going to do. For the government only two council members can talk to each other outside a public meeting. Many issues take much more time than public meetings allow. Many issues will take months or longer to resolve within the government while they may take hours or days within private industry.

But the experience has also been very rewarding. I know that I can have a positive impact on the city and the people who live and work here. I've enjoyed meeting and working with different people in the city. I've been very impressed and humbled by the volunteers and the quality of work they provide on their own time to the city, as well as the public works department and their ability to keep the city so clean and safe. There are many positive things we have to look forward to in the city of Norcross.

DI: How has your experience in practice informed your approach to government?

DW: Focus on quality, listening to people and looking for creative solutions in a timely manner.

DI: You've been a champion of sustainable and healthy design in your practice. How has your role on the council enabled you to promote a more sustainable and healthier city?

DW: This is a very good question but difficult to answer. The committee on sustainability is doing a very good job but getting their message out to the citizens and to implement their ideas can be challenging. Also, the issues for sustainability and healthy design solutions for the city are in the public spaces, where in private industry I focus more on the building design. The development of parks and focus on

pedestrian and bike paths are the key issues. What is somewhat helpful is the SPLOST money is directed to parks, sidewalks and bike paths. If the SPLOST was ever voted down our community would feel the pain almost immediately. I would actually like to see the SPLOST increased to accelerate some of these projects. Over time we will get enough done to link the bike paths and sidewalks to enable people to walk more and ride bikes to adjacent neighborhoods. A key focus we have is to provide safe pedestrian crossings on busy, major roads in Norcross.

We all need to get more involved in politics to move this country forward. As citizens and as a profession, we cannot sit on the sidelines. We must understand the issues and be informed. We must get to know the candidates as well as the people who are already serving. We can be a key part of the solution to better communities and a better world.

Dan Watch is science + technology practice leader, principal, at Perkins+Will.

In Search of Zen

How do we know if a building is doing well by the building occupants and the environment? Answering this question is tricky. For instance, LEED measures sustainability within a building by focusing on the built environment including location and access to daylight, materials, building systems, and energy performance. The WELL Building Standard and Fitwel take a different approach, by examining how the built environment can support a healthy workforce through access to fitness facilities, the outdoors, and contemplative spaces.

LEILA KAMAL, TERESA RAINEY AND LEIGH STRINGER

There are also many other programs completely independent of the A/E industry that measure occupant and/or employee satisfaction, like *Fortune* magazine's "Best Companies to Work For."

To truly understand if a building is "high performing" (another industry term for just about anything deemed important for the outcome of your building design) we must consider how to tie all these things together. What are the key elements to a physical space that supports a high performing occupant AND an optimal operational performance (indoor air quality or energy use, for example)? Can there be a correlation between "feeling a lack of control" at work and how space is designed? Similarly, can we find a connection between "it's too hot, or too cold" with "lack of sleep" or job satisfaction?

At EYP, we became so intrigued by this challenge that we began a quest to see what we might learn if we were to measure for a single building the combined elements of well-being, productivity and energy performance. We called our research project: "In search of Zen."

We started by working with several strategic partners, including academic and technology experts, to establish the various ways to effectively and efficiently measure key elements of our study.

Our in-house workplace expert, Leigh Stringer, developed an important strategic relationship with the Center for Health and the Global Environment at **Harvard University's T.H. Chan School of Public Health** and introduced us to their SHINE (Sustainability and Health Initiative for Net-Positive Enterprise) program, where they are developing an innovative survey tool that measures the Health and Human Performance of building occupants while identifying innovations that can improve the health of people and the environments in which they work. In this relationship, EYP provided important expertise and guidance to both the SHINE program and the development of the HaPI (Health and Human Performance Index tool that evaluates well-being, productivity, engagement, culture and the built environment) relating to the building environment and our understanding of the impact of physical space. Here are some of our key findings:

Exercise is connected to office location

Our employee data shows a correlation between the amount of exercise employees are getting and office location. Employees assigned to an office with a shorter commute, in an urban vs. suburban location, access to public transportation, access to a park and views to the outdoors were more likely to exercise more.

Lack of sleep is connected to work commute and workload

Lack of sleep was attributed to heavy workload, increased stress and longer commute time. Interestingly, the demographic of employees who sleep the least (and reported being the most stressed) are women, particularly those under 45. This falls in line with nationally reported data.

Stress impacts performance more than physical health issues

Overall, employees claimed mental health issues (stress and/or anxiety) were more impactful to presenteeism and absenteeism than physical health issues. This number went up for women and younger staff. There are many reasons employees might feel anxious like lack of sleep, lack of exercise, a heavy workload, or feeling a “lack of control” as to how, when, or where they get their work done.

Culture affects everything

When Harvard tested questions about culture, the work environment, amenities provided and workplace flexibility and then compared them to job performance and life satisfaction, their analysis confirmed what we suspected. Culture has a stronger impact on our health outcomes than the other factors by a long shot. Organizational factors like trust, respect, fairness, vibrant atmosphere and authenticity were correlated with job productivity and life satisfaction more than anything else. Though not as highly rated as culture, there were some physical workplace elements that more strongly correlate with job and life satisfaction than others. These include: a place to lie down at the office, a place to meditate, bike storage and showers.

“Job Control” is the most influential factor when it comes to job engagement

Factors like autonomy in decision making, learning new things, using creativity, using individual skills and abilities and “having a say in what happens with your job” impacts employee engagement more than other factors.

“We began a quest to see what we might learn if we were to measure for a single building the combined elements of well-being, productivity and energy performance. We called our research project: *In search of Zen.*”

We also teamed with **Crowd Comfort**, a software and services company that aims to transform the real estate management space with its crowdsourcing platform. With a user-friendly mobile application, occupants can become the eyes, ears (and nose) of the building with input like: It’s too hot/too cold/too loud; hey what IS that smell? The input by our employees is then tracked over time and attributed to various zones within the building that were predetermined by our research team.

Initially, employees were consistent in sharing their feedback through the Crowd Comfort application. Over time, though, the novelty seemed to wear off and less feedback was shared. However, the feedback we did receive was consistent relative to temperature issues and acoustical issues. There was less consistency from people relative to perceived brightness. We think that this may have been due to the fact that the daylight harvesting automatic shade devices were not fully commissioned at the time of our study and may not have been functioning properly. Ultimately, though, we were able to identify specific areas in the space where we could make improvements in temperature and acoustics that resulted in improved employee feedback.

Local microclimate was measured and recorded using space-mounted Bluetooth-enabled HOB0 sensors and data loggers. Temperature, relative humidity and carbon dioxide was measured in seven locations. The floor plate was divided into three unique “zones” including East, South and Corporate zones. For the larger East and South zones, three sensors for each zone were distributed across the perimeter, center and interior areas to enable correlation of microclimate parameters to occupant feedback. Plug load data loggers were connected to several workstations to measure the actual energy used by the typical office equipment. The devices used were also HOB0 Bluetooth-enabled data loggers.

Last, we partnered with **Rifiniti**, a company that reinvented workspace utilization by introducing a cloud-based data analytics tool allowing us to measure utilization, collaboration and mobility over time and then compare that to energy performance. This tool helped us tie together occupant behavior with building performance.

Tying it all together

We learned that there were areas of our building that were designed for higher occupancy levels than we anticipated. So a conference room, for instance, that was designed for 20 was most often being used by 4 or 5 people at a time and was typically being used from 9:00 in the morning until 2:00 in the afternoon. Those same conference rooms were consistently getting complaints about being too cold. This information allowed us to identify adjustments to our system such as modifying the variable air volume terminal units serving the conference rooms to shut off when the room is unoccupied, thereby minimizing over-cooling of the space. Of course, we also questioned if we needed that many large conference rooms or if smaller conference rooms would be more efficient in the future, both in terms of how people were using them and in terms of energy performance.

We also found that when we had the highest utilization at 40–60 percent occupied between 9 am to 2 pm, the space temperatures were less of a problem for our staff, averaging around 74 degrees F with a corresponding relative humidity (RH) of approximately 35 percent—conditions that most people found comfortable.

We were also able to compare carbon dioxide (CO₂) levels to our utilization throughout the day. As expected, we could see the CO₂ levels peak as utilization increased; peaking at 800 ppm and then dropping as the mechanical system responded by increasing outside air volumes. One observation we made is that the mechanical system responds to a return air-mounted CO₂ sensor which is set to increase outside air to maintain a maximum of 725 ppm. The local sensors peaked at 800 ppm, indicating that the CO₂ setpoint should be reduced to account for the mixing of all spaces in order to achieve a maximum of 725 ppm at the space level.

Plug load was also something that we were able to correlate to our utilization studies and found that perhaps most importantly, equipment was not being turned off after hours in the way that we had predicted. To solve this, it was a matter of determining what equipment was still running and implementing an office protocol to limit after-hours usage.

Overall, the results of our study were also helpful to us in communicating to our staff the impact that they were, by their very behaviors, having on the energy performance of the building.

“In the future, we will be taking a closer look at the new frontier in building research—what we cannot see. Microbiome research is helping to analyze indoor environments along with their dynamic systems to better understand connections between occupant health and the built environment.”

So what’s next?

In the future, we will be taking a closer look at the new frontier in building research—what we cannot see. Microbiome research is helping to analyze indoor environments along with their dynamic systems to better understand connections between occupant health and the built environment. Through our new

strategic partnership with the University of Oregon and their Institute for Health in the Built Environment, we foresee an opportunity to further our research in the ZEN Building by studying the microbiome during periods when the HVAC systems are operating in outside air economizer mode versus minimum outside air operation. We are interested in understanding if the microbiome during outside air economizer mode looks more like the outdoors as research suggests and learning if occupants are more satisfied with the indoor environment during this time of year.

Additionally, research conducted through the COGfx Buidingomics Study by Harvard TH Chan School of Public Health and SUNY Upstate Medical University has shown that exposure to blue-enriched light during the day led to improved sleep quality scores and improved cognitive function. Based on these findings and other similar research, we'll be investigating how buildings impact the indoor microbiome, air, chemistry, thermal and visual comfort, perception, psychologic and physiologic response in order to better design for health, energy and the next evolution of high performance buildings.

What does this mean for our profession?

Several years ago, before we launched EYP's research program, a client in an important meeting asked our design team if we could guarantee that his new building would help increase enrollment in the sciences—would the investment in bricks and mortar be worth it?

Our clients are changing, and as we gain more access to data and information about how people live, work and learn in our buildings, it has and will continue to be incumbent upon architects and designers to create not just physical space, but expected behavioral outcomes for the people using our spaces and buildings. We have found that by forming strategic public and private partnerships, we have become more conversant in a wider range of disciplines which has resulted in more accurate and sophisticated building research.

Today, with the enthusiastic support of our clients, we have enough data, information and examples that we can answer the question “is it worth it?”; maybe not with a guarantee, but with a very high level of certainty that if we are able to incorporate certain elements into the design of the building, we can, in fact, influence for instance, enrollments in the sciences. Based on our research, we can now prove that building design does have that kind of impact.

Leila Kamal—at the time of this writing—was chief design strategy officer and principal at EYP.

Teresa Rainey is director of high performance design at EYP.

Leigh Stringer is a workplace strategy expert with EYP.

A Case for Regenerative Design: An Interview with Jason F. McLennan

In talking with A/E/C leaders, we have discovered that as an industry, we have not yet achieved a common vocabulary of terms and ideas around regenerative design. In order for regenerative design to come to scale and become the new standard of design that everyone follows—in the way sustainability has scaled to a point through LEED—the industry needs to center around a clear picture, at least on a conceptual level, of communication defining regenerative design.

DESIGNINTELLIGENCE

DesignIntelligence talked with Jason F. McLennan about building a common vocabulary of ideas and terms, the philosophy of regenerative design, how it works for people in the market, how to get the word out and more.

DesignIntelligence (DI): How do you feel the idea of regenerative design has evolved since the beginning of your career?

Jason McLennan (JM): Regenerative design was not really a topic at all at the beginning of my career. It was not something that was discussed. Even the notion of green architecture, or sustainable design, was in its infancy. The idea of regenerative design, regenerative building, was not on the radar. That's one of the main reasons why I created the Living Building Challenge.

Today, that has changed. The first phase was making sure that there was a general common understanding of the language around sustainability and green building. Obviously, LEED and the US Green Building Council were at the heart of that work during the late 1990s and early 2000s. It wasn't until the mid-2000s that discussions started more broadly about going beyond and being regenerative, even though several of us were talking about the same sort of concepts but using different language for many years earlier.

Until recently regenerative design was more of a fringe topic, and it is just now becoming a more mainstream topic, in part because of the Living Building Challenge and the good work by people like Bill Reed who have been teaching about these ideas for a while. But it's still a misunderstood niche with many barriers—pragmatic barriers as well as mental barriers—that are in the way of getting there.

“The idea of regenerative design, regenerative building, was not on the radar. That's one of the main reasons why I created the Living Building Challenge.”

In one sense, it has taken a while to get to this point. But on the other hand, in the span of time relative to architecture, it has been a fairly quick evolution. We've gone from no awareness and a non-topic to beginning to, as an industry, put our arms around what it means, and defining the philosophy and the criteria. But we're still in that next step of pushing out awareness and understanding, which will take more time.

DI: How has the language evolved around regenerative design in this time period?

JM: There's the beginning of a common language, and what is often typical with any sort of idea or meme is the eventual convergence and agreement around its meaning. There can be splintering, but there can also be convergence where there may be different schools of thought that use slightly different words or metaphors or tools to potentially get at the same thing. A good example is different schools of martial arts that teach a similar philosophy through different techniques.

"If we draw a graph about the negative global impacts we're facing due to population, climate change and more, the graph would be exponential. And yet, we have linear progress relative to the design industry and construction industry's response to the problem. We're making progress."

So, we either continue to diverge or we continue to converge, and at this time I think we're trying to converge around, again, the common language and common understanding of regenerative design. We need to have somewhat of a consensus around what it means, and then there may still be divergence around some of the methodology that's used to be successful, but it's helpful to have a common language and a common framing. That's what I try to do with Living Building Challenge—to create clarity around a model and a way of thinking and then push awareness.

DI: Do you feel that the A/E/C industry is headed in the right direction regarding regenerative design?

JM: Yes, if slowly. The problem is the magnitude of the issues that we're facing. Think of it this way: If we draw a graph about the negative global impacts we're facing due to population, climate change and more, the graph would be exponential.

And yet, we have linear progress relative to the design industry and construction industry's response to the problem. We're making progress. The graph is going in the right direction. The unfortunate thing is the issues that we're trying to address are growing exponentially, not linearly. That's the problem. If we had started this movement in earnest back in 1950, it's possible we could have been ahead of these issues, but we're not and we're not going to be. And so, therein lies the challenge.

The good news, in one sense, is that we are building the models. We are building living buildings. We are working to create tools and the standards, frameworks and the literal examples that in theory, would make a dramatic shift possible. But there will have to be a crisis or an outside change, like radically new codes for example, for a mandatory shift to happen. For example, when the great fires of Chicago and San Francisco happened, new regulations and codes were put in place that still shape buildings today. We need that level of sea change for energy and climate.

Another example is the ADA (Americans with Disabilities Act). Some firms were designing/constructing compliant buildings even before there were accessibility regulations. However, the trajectory was pretty slow until the government passed the ADA.

DI: Beyond codes and mandates, what else do you think it will take to scale regenerative design and have universally adopted standards?

JM: Basically, the other path is the economic path. As we know, change happens rapidly when there is a strong economic reason to do so. We've been working hard to make green buildings less expensive, and that is working at certain levels of performance. There will come a time when we reach a crossover point—where the better thing is cheaper, and then the uptake will be immediate.

We're closer to reaching that crossover point with renewable energy and solar in particular. Certainly, in many markets around the world, solar is now the cheapest form of new energy generation that can be installed—and that's why it's being installed.

A recent example of this rapid adoption is LED lighting. When LEDs first came out, they were very expensive and they weren't very good. We tried for years to make fluorescent and incandescent lighting the standard, but there were efficiency and environmental problems with both. Now, suddenly LEDs have replaced both fluorescents and incandescents almost overnight. This is a huge victory in terms of energy efficiency and fewer toxins in the environment. But it happened because of an economic driver, and the change was measured in months, not years.

If something has an economic basis that can win, if it can be cheaper and better, the adoption will happen very quickly. And so, I believe that change will happen in relation to energy-related issues, but there are other, more difficult issues that aren't so easily translated to economic payback. That's where legislation becomes necessary.

DI: Another example of this idea of rapid adoption is the tablet—how quickly they entered our lives and became pervasive. But tablets are on a completely different scale than buildings. Another unique issue with the built environment is this massive stock of existing buildings. How do we deal with those?

“When the great fires of Chicago and San Francisco happened, new regulations and codes were put in place that still shape buildings today. We need that level of sea change for energy and climate.”

JM: Existing buildings do have a different layer of scale that makes them slower and more difficult to change. Buildings are bigger. The systems are not controlled by a single manufacturer. A computer is made by a single company, and then they have a supply chain that they influence. A building is not made in the same way. It's usually a custom product, and there's interchange between many other companies in addition to the material supply chain.

So the process of change is much slower and more difficult. It takes longer to turn that ship around. But it's on a different timeframe because it's more complex and burdensome.

DI: If we circle back to this idea of language and vocabulary, what needs to happen to help with both scaling regenerative design and making the pace of progress more rapid?

JM: The most powerful thing that we can do is build models that show what we're talking about. That's at the heart of the Living Building Challenge. With something as tangible as a building—like a home or an office building—most people need to see it and experience it in real life to understand what regenerative design means.

On one hand, there is the work that we need to do to get our language right and our visions correct. There's good information out there, but we still need more beautifully designed examples of the philosophy of regenerative design and how it works for most people. Because most people don't exist in a world of philosophy. It's too abstract, and that's fair enough.

For the sea change to happen, we need to build it and it needs to be beautiful, which is why I always focus on beauty and good design. The wrong models set us back and the right models bring us forward.

And it is also human nature that people need to see deep green examples in their own backyards. People will find ways to not believe it until they literally see a house that they can imagine themselves living in or working in an office building that has exactly the same uses that they have. Otherwise, they assume that it doesn't apply to them or their situation.

People also need to see it working economically. The models have to be pragmatic and beautiful. They have to make sense. This is the phase we're in now. We're all in a bit of a hurry to show the world that this different way of building is better, to build the deep green examples—to build the iPhone for buildings, if you will. That's why Denis Hayes built the Bullitt Center, which made a big difference for a lot of people.

DI: What do you think are some of the more persistent misconceptions or misperceptions about regenerative design?

JM: Like any concept or word, the term *regenerative design* is starting to get co-opted, which is a sign that it's getting traction. But it's also important to counter that diversion wherever possible. In the same way that "green" got slapped on anything, the momentum will weaken and become diminished. Essentially that's why LEED was established—to create a series of standards and definitions of what "green" has to mean.

That's also what I tried to do with the Living Building Challenge—to co-opt that tendency from the outset to define what "green" has to mean, at a minimum.

DI: What is the role of ILFI (International Living Future Institute), or even a similar organization, versus what you can do in professional practice?

JM: ILFI serves a very distinct and different purpose. Practitioners are solving individual problems. The role of the Institute is to rise above the level of a particular project and to rise above

competition between firms and entities and to do the job of being the gatekeepers and the curators of those ideas. In essence, the Institute's purpose is to serve the industry more broadly and to serve the environment more specifically.

DI: What do we need to change in A/E/C in terms of scaling up projects and getting the projects out there?

JM: There are still some regulatory barriers, especially around water and waste, that need to change nationwide so that it's not so difficult to do what we're advocating. There are also educational barriers—what we're teaching in schools and trade associations. And there are attitudinal, cultural barriers and economic barriers.

And finally, we as an industry need to focus on making this issue relevant. How can we increase awareness? How can we make ideas concrete for people? How can we inspire change? It is such a vital topic.

Jason F. McLennan is CEO, McLennan Design and Founder, Living Building Challenge.

Defining Regenerative Design: An Interview with Colin Rohlffing

In talking with A/E/C leaders, we have discovered that as an industry, we have not yet achieved a common vocabulary of terms and ideas around regenerative design. In order for regenerative design to come to scale and become the new standard of design that everyone follows—in the way sustainability has scaled to a point through LEED—the industry needs to center around a clear picture, at least on a conceptual level, of communication defining regenerative design indicators and metrics.

DESIGNINTELLIGENCE

DesignIntelligence talked with Colin Rohlffing, Director of Sustainable Development for HDR Architecture, about regenerative design—what it means, how to define it, how to scale it and how regenerative design can foster a new generation of ideas and inspiration.

DesignIntelligence (DI): Why is the idea of sustainability not enough?

Colin Rohlffing (CR): The original intention and definition of *sustainability* is essentially what we're trying to accomplish right now with regenerative design. Over the years, the actual phrase *sustainability* has been watered down, used incorrectly and overused to the point where it no longer stirs the blood of designers or owners. It has become very basic in conversation, associated with just doing what I consider to be minimal engagement. Sometimes it's just code engagement. There are many industries beyond the design industry that have altered their nomenclature because words and perceptions matter. It's unfortunate, but I believe we need to use different words to foster a new generation of inspiration and thinking.

DI: For you, is the idea of a common vocabulary focused on the design and construction industry or is it a broader language that would be shared by owners and other stakeholders? Is there a need for a shared understanding of definitions of words or even a whole new set of terms?

CR: It's smart for us to take simple steps for creating a common language and vocabulary of terms and ideas around regenerative design. The design pioneers of regenerative design philosophy have laid the groundwork and have caused us all to think differently. We need to go beyond just building systems thinking to ecological systems thinking as well. But there is so much new vocabulary around the subject of regenerative design that we need to set a more universal foundation and build greater understanding and consensus first. It's not just defining the words, like *regenerative design*, *restorative design* or *biomimicry*, because they've been defined fairly well. But those words can only go so far. It may be that we need a sub-glossary to define what comes next that can be even more important. When we define things better, universally, among peers and competitors that are all looking for the same common goal, we tend to get more traction. Just look at what has happened with the AIA 2030 Challenge reporting among design firms for the past 8 years.

Regenerative design is not a new concept. It has been around for 20+ years, and there are projects that incorporate many of the components of regenerative design. But there hasn't been a framework that we can all look to that is the standard.

When we talk about regenerative design today, it's very philosophical and inspirational, but I believe there's also a gap. What seems to be lacking is the practical metrics of "my client has a question; how would nature solve this problem?" Design teams don't always have the resources at their fingertips to find out how to create a design solution to mimic the way nature solved a problem and what metrics to strive for. And there are many practitioners who need a little more direction on actual metrics to help them think of a certain strategy or hit a certain target to solve the problem nature's way.

As an example, many of us think about the water cycle in a very basic way—the fixtures in the building, the processed water in the building, the site water usage and that's it. We draw a boundary line and we don't think about the broader ecological picture. We don't consider things like aquifer recharge, salinity, surface vs. ground temperature or how the water cycle influences local flora and fauna from a biodiversity standpoint. We don't really hone in on all the different measures of water quality and the health aspects that nature is considering. A sub-glossary of terms and target metrics that takes us beyond what we're used to—such as fixture flow rates, flush rates, etc.—will be helpful to point out what to consider in the water cycle as nature would intend. And this is where we introduce complexity because this is ecological systems thinking and not just building systems thinking.

DI: How helpful are the existing standards?

CR: There's definitely a spectrum here. We have LEED. Then we move into Living Building Challenge where we have, for example, definitions of net positive water for a site, which is much more stringent and holistic. WELL views these elements through a different lens: it's water conservation at the holistic systems scale plus water quality and how water quality impacts people's health. This is about as far as we can go currently into net-positive territory. With a sub-glossary,

we move deeper into the impact on nearby ecology and how we can mimic nearby "pristine" ecology. Where does the water go after it comes off the building site? Is it recharging an aquifer? Is it contributing to better biodiversity and biological health in the region? This is a complex equation to solve, but LEED, Living Building Challenge and WELL have gotten us to this net-positive terror. This is just one more step.

DI: Are you also thinking about issues like the community and social justice in this arena?

CR: Every design project, whether it's a regenerative design project or not, should always consider social equity and community issues. This is a gray area for hard metrics, but a very necessary design philosophy to be addressed. We're not strictly looking at engineering calculations and metrics, we're not just looking at environmental science or ecological performance. We're also looking at the cultural and social cues of each project, working to solve society's larger problems. Architects and designers can be a part of the answer around social equity and the cultural impacts of a site. This will always be a dynamic, evolving target, though, based on the political climate and social issues.

"Every design project, whether it's a regenerative design project or not, should always consider social equity and community issues."

We may never get to a point where we completely nail down achievement of those metrics, but it should always be a philosophical conversation in any design engagement. Ignoring it would be a missed opportunity for designers to improve society.

DI: What else do you think it would take for regenerative design to become a universally adopted standard of practice?

CR: If we can't inspire designers or owners, it's not going to take off. It has to be exciting, it has to be inspirational, it has

to be practical. It can't just be metrics because then, if you only have metrics, it's just another checklist and another rating system that no one wants to push the paperwork on.

DI: The pioneers have been talking about regenerative design for a while. Why do you think it hasn't caught on to a larger degree than it has?

CR: First, I'd like to tip my hat to people like Jason McLennan and Bill Reed. They are deeper thinkers who see things that others don't. When talking about this regenerative design framework with some of my colleagues in the industry, sometimes the concept is hard to grasp. I know what we want to achieve, what the end goal is, but not everybody can grasp that concept right away. It's important for all of us to take it slow and simplify in order to help it catch on—that's why we've just talked about the definitions.

DI: So this is an approach that's based in practice and real-world experience as opposed to working everything out on paper, theoretically, before getting started, right?

CR: Yes. We've tried these engagements in the past, using concepts of biomimicry, and I've seen time and again that clients have a hard time wrapping their heads around certain concepts of biomimicry until they see a practical design solution that hits the target. The lessons we've learned are if we only have these philosophical arguments and no real design strategies or biometrics to back it up, it's going to lose its mystique. When clients are more technical in nature, they want to know the practicality of the solution we're offering. We want to inspire them through the philosophy but then show them how.

DI: What will help this whole idea of scaling regenerative design?

CR: Until large firms discuss these concepts in detail with a client in the context of a potential project, regenerative design may remain prevalent on only a small amount of "bleeding edge" projects that we all wish we could work on.

"Until large firms discuss these concepts in detail with a client in the context of a potential project, regenerative design may remain prevalent on only a small amount of 'bleeding edge' projects that we all wish we could work on."

DI: How is HDR going about building a regenerative design practice?

CR: The first step is the philosophical step. In our Seattle office, we've hired a Director of Regenerative Design and a managing principal who understand the concepts and the theory behind regenerative design. We won't align with clients on every project, but the fact that the two leaders in the office use regenerative design as the starting point for all project engagements is our first step. So our approach to building HDR's regenerative design practice is philosophy and discussion first, details and metrics second and hopefully inspiration and adoption third.

If we build a universal framework and a common vocabulary around regenerative design, it at least gives every design firm the opportunity and a place to start.

Colin Rohlfing is director of sustainable development at HDR Architecture.

GLOBAL INSIGHTS

Australia's Ranking for Energy Efficiency Highlights Greater Issues

In the 2018 International Energy Efficiency Scorecard, Australia has been ranked the worst nation for energy efficiency in the developed world.

LEXI LIDAS

The scorecard—produced by the American Council for an Energy-Efficient Economy (ACEEE)—examines the efficiency policies and performance of 25 of the world's top energy-consuming countries. It's a critical report because together, the 25 countries represent 78 percent of total energy consumed on the planet.

Sadly, but not surprisingly this year, Australia slipped in the rankings from 16th in 2017 to 18th in 2018—making it the worst-performing nation among all developed nations evaluated by the ranking. In 2014, Australia was ranked 10th most energy-efficient nation. This is a concerning trend. What's more disappointing is that, if we mirror these calendar years to critical changes in policy positions at a federal level, we can instantly see a correlation.

Although we are falling behind our counterparts, the scorecard had one positive for Australia—building energy efficiency—the only category where we outperformed the median. That said, no country came close to a perfect score, and the average remained the same as in 2016—51 out of a possible 100 points.

We are doing well in this area, but it really isn't enough. Here's why:

- Buildings consume over half of Australia's electricity.
- In 2050, 51 percent of Australia's buildings will be built after 2019.
- We need a reduction in Greenhouse Gas emissions (GHG).
- Increased building performance is key to resilience in extreme temperatures.

- Australia's infrastructure cannot cope with the increased energy demands.
- Australian households are paying the highest electricity prices in the world.

Australia has been slipping behind on sustainability for a long time. In general, as with most big policy issues there seems to be a big disconnect in the sustainability space between needs and practice. The ethical imperative of caring for mother earth for future generations is just not demonstrated in our everyday behaviours. But why? Australia is brimming with enthusiastic sustainability and energy professionals, but the same old story gets in the way: cultural and cost barriers.

Why won't our clients pay for it? Why aren't sustainability practices a normal part of everyday life?

As things stand, Australians are paying two to three times more than U.S. citizens for power, a drastic reversal from the 1990s when our power bills were the cheapest in the world. Our power bills are, on average, higher than those in countries where electricity is taxed heavily, such as Germany, Denmark and Italy. This means that at market price Australians pay the highest electricity prices anywhere in the world.

Buildings are a key driver of peak demand across the electricity grid. In Australia we're very focused on the supply side of the market, the per unit cost of energy. But we tend to forget that our energy bill is a function of unit cost and volume, and that's what other countries around the world are really focusing on.

Australia is experiencing increased energy demand at peak times. To meet this increased demand, we need to build more infrastructure to deliver it to our homes and businesses. This applies to poles and wires for the electricity network; pipelines and equipment in the gas industry, plus other equipment for industrial users. The costs for this extra infrastructure are passed on to consumers. If we can slow down the growth in demand, or even reduce our energy consumption through efficiency measures, we can avoid the added infrastructure costs.

“Australia has been slipping behind on sustainability for a long time. In general, as with most big policy issues there seems to be a big disconnect in the sustainability space between needs and practice. The ethical imperative of caring for mother earth for future generations is just not demonstrated in our everyday behaviours. But why? Australia is brimming with enthusiastic sustainability and energy professionals, but the same old story gets in the way: cultural and cost barriers.”

Most energy used in Australia still comes from hydrocarbon-based sources with varying degrees of associated GHG emissions. Even though we are seeing a transition to renewables, it is expected that hydrocarbons—particularly natural gas—will be used for many years to come. If we can use these resources more efficiently, we can help Australia reach our GHG reduction targets.

Improved energy efficiency requirements could reduce new building energy use by up to 56 percent through the use of simple measures such as more airtight buildings, higher levels

of insulation, more shading, ceiling fans and light-coloured walls (in warmer climates), and increased efficiency standards for lights, hot water equipment and air conditioning units.

There are pushes for changes to building codes, but the real issue in Australia is a lack of engaged hearts and minds on the topic, as well as a lack of understanding that the short-term pain of additional costs has long-term economic and environmental benefits. Money talks, and if our clients had more information about the additional upfront costs vs. the longer-term savings, many might seek the additional financing required.

Everything is a sales pitch, and most decisions are driven by money; which means we can drive change when we are supported with the economic facts. Having formerly worked as a lobbyist, I utilise the following framework to contextualise the information I include in my pitches:

- How can I save your organisation money (and/or even make money)?
- How can I help you do your job?
- What information do you need to on-sell what I am telling you with ease?

We can see that Albania, Iceland and Paraguay obtain essentially all of their electricity from renewable sources—Albania and Paraguay receiving 100 percent of their electricity from hydroelectricity; Iceland’s is 72 percent hydro and 28 percent geothermal. Norway obtains nearly all of its electricity from renewable sources—97 percent from hydropower.

Investment in renewable energy was higher in the world’s poorest countries than the wealthiest ones for the first time last year, according to report by Renewable Energy Policy Network for the 21st Century (Ren21).

We can see how the “sales pitch” framework I have included above applies to these countries. Christine Lins, REN21’s executive secretary, pointed out this record level of growth had been achieved despite governments around the world heavily subsidising fossil fuels. Sadly, for every dollar spent

boosting renewables, nearly four dollars were spent to maintain our dependence on fossil fuels. However, countries are opting for renewables because they are not only the most environmentally sound, but also the cheapest option—which is a clear signal of the economic viability.

We need to be realistic when we on-sell sustainability measures to our clients. In a country where climate change is a political football, we must drive change with economic facts. We must send in our best staff to sell for us and arm them with cold, hard figures. We must think through and genuinely reflect by asking ourselves this question: Can our team speak to the economic viability of sustainability? And if so, are they able to relay this in simple lay terminology?

Engaging hearts and minds on sustainability issues is critical, but let's rethink why and how we will achieve this. In 2015, the Pope bitterly condemned the human failures that have eroded much of the environment. What impact did this have? Very little.

Why? The Pope's paper did make a huge statement, but with very little impact. While his intentions were well meaning, pointing his finger at humanity and waving it with disgust is globally recognised as the best way to disengage an audience—so it was perhaps not the best approach.

“We really have not engaged people's hearts and minds on sustainability on the scale we need because perhaps we are not truly committed ourselves. Actions do speak louder than words.”

We really have not engaged people's hearts and minds on sustainability on the scale we need because perhaps we are not truly committed ourselves. Actions do speak louder than words. Given how far behind we are on sustainability, let's think about this with the most basic examples: Are we designing and building food courts which operate on 100 percent disposable

plates and cutlery? Or do hotels still utilise the tiny disposable shampoo and conditioner bottles? Are our firms still serving large amounts of meat and handing out water in plastic bottles at corporate functions? Our office kitchens might have containers to separate the recyclables, but do we know what happens to it once it's collected by the office cleaners?

If we want to engage the hearts and minds in our community, sustainability needs to be a key value in our business which is genuinely reflected in our actions from within our firms. Leaders need to lead on this issue and have tough conversations, even walk away from clients who do not reflect our values. In Australia, trust in government is at an all-time low, while trust in the CEO is higher than ever. In the 2018 Edelman Trust Barometer, 65 percent of respondents agree that CEOs should take the lead on change rather than waiting for government to implement it. And 63 percent of respondents believe that companies can take actions to increase their profits, while simultaneously having a positive social and economic impact on the society where that company operates.

Now more than ever, people are looking to the business community for solutions. We can engage with the community on the issues on a deeper level, talking about the plain and simple facts. We can have an impact by genuinely looking within and adopting practices which reflect the values of the world we want to live in.

Alexia Lidas is managing director, DesignIntelligence Australia.



Sustainability Trends: A Global Perspective

The international movement toward increased sustainability in the built environment is strong, but local differences vary greatly in their impact on the design community.

NICO KIENZL

To paraphrase Christina Figueres, Executive Secretary of the United Nations Framework Convention on Climate Change, in her remarks when accepting the 2018 NY Architecture League award for her work on the Paris Agreement, the global drive toward sustainability is like a highway; every nation is in a different vehicle, at different speeds, but we are all going in the same direction. Atelier Ten's exposure to key markets through our ten international offices give us a first-hand understanding of how these drivers translate to real projects.

Though not necessarily implemented through consistent frameworks or approaches, sustainability is an increasingly important driver in design across the world. Local environmental constraints, regional attitudes to environmental protection and political priorities dictate how individual parts of the world adapt to more awareness of the built environment's impact on both human health and natural resources.

A common challenge globally is staying current with code development and policies that take the next step of meeting ever-more ambitious energy or emission goals. For example, in the UK, national building standards have been falling behind in terms of metrics used to accurately reflect what's happening on the electrical grid and the associated carbon emissions. Some of the standard calculation methods will report that cogeneration is desirable, when the amount of energy on the grid that comes from renewables has changed so much in

recent years that, from a greenhouse gas emissions standpoint, this is not necessarily true anymore. Similarly, in California, Title 24 is lagging behind in what the industry knows needs to be done in terms of electrification of the building stock. We, the people on the forefront of sustainability, need to make sure that the development cycles of these codes are keeping abreast or even anticipating what is happening both on the energy supply side and the larger policy goals.

Throughout the years there has been a lot of innovation in this arena, especially when there is a divergence between local, state and federal or national codes. In Massachusetts, for example, the stretch code concept allows local municipalities to set a target beyond the minimum requirements of state energy code. That is a big shift in code thinking—to provide a percentage by which to beat the code instead of meeting it. This way the code becomes a performance-based standard, a solution that is emerging more frequently, especially as the targets are becoming more ambitious. Developers or clients who typically just followed the prescriptive requirements of a code are now being pushed into modeling and performance analysis that has not really been applied to many projects before.

A lack of political leadership is often to blame for slow energy code improvement. A case in point is Australia, where energy code development has been lagging and commercial building energy codes have just recently been updated to more current global standard levels. However, there is no

clear projection for future code improvements, despite the country's participation in the Paris Agreement. In the absence of national leadership on the issue, it is cities and larger private or institutional developers that are advancing environmental standards, realizing the value of better buildings, and including them in their corporate or urban development goals. This is a trend we see globally in regions where larger regulatory frameworks and long-term commitments are weak or missing.

The good news is that in many regions, sustainable third-party certification—whether it's LEED, BREEAM, Green Star or GreenMark—has become the new baseline if not a regulatory requirement because it can be implemented quickly and flexibly. For example, BREEAM Excellent is now essentially a regulatory requirement in London, and LEED certification is a requirement for larger buildings in San Francisco. These certifications are not just technical requirements; they tie in to the institutional or corporate mission of clients, many of whom have other environmental benchmarks they're tracking as part of their comprehensive environmental impact reporting, making building sustainability an integral part of their identity.

Asian markets are also making strides to catch up to the United States and Europe in sustainable design, and some are emerging as leaders in that part of the world. Singapore has always been very strong in its commitment to the quality of its urban environment, while—despite common belief—China is demonstrating a growing commitment to addressing the environmental impacts of its large-scale developments.

Europe, on the other hand, remains a mixed bag. Strong economic engines like Germany and Belgium are doing very well on sustainability, following a clear and strong trajectory that has been set by EU policies on climate change and environmental protection. Those policies have been translated into binding national plans despite some political turmoil on the energy supply side. In the UK, however, Brexit has shifted priorities and sustainability is no longer a strong focus. While the UK still has a very active construction market, the uncertainty of Brexit has slowed down the push for more stringent regulations or innovative market leadership around sustainability, stalling code developments and commitments in this market.

Another factor that greatly affects the global market gaps surrounding electrification of buildings is the diversity in climate around the world. Places with milder climates (and consequently a low heating demand) are ahead in the development of electric buildings powered by renewable energy instead of fossil fuel sources. A city like Bangkok, for instance, does not have a natural gas grid, and nobody trucks in oil to heat buildings. Because of the city's average mild temperature there is no demand for large amounts of high-grade heat. By default, their buildings are often already all-electric. In contrast, in climates with a much higher heating demand, like the northeastern US or the UK, electrification is still a challenge. The need to provide heating efficiently makes all-electric systems difficult to implement, and the environmental viability of electrification depends very much on the makeup of the local electricity grid.

We can see this difference if we look at California that now has lots of renewable resources on the grid and enjoys the advantages of all-electric buildings from a climate emissions standpoint. In contrast, in New York City we are expecting an increase in carbon emissions for grid electricity, as in the coming years the Indian Point nuclear power plant will go offline, resulting in local fossil fuel plants to replace capacity. In this case, local small-scale fossil fuel cogeneration will be a more greenhouse gas advantageous strategy over the all-electric buildings, due to the ability to reuse waste heat from fossil power generation for heating. This means building electrification will lag behind until the local grid has a higher renewable fraction and the carbon emissions factors shift favorably to fossil fuel-free buildings.

“Local environmental constraints, regional attitudes to environmental protection and political priorities dictate how individual parts of the world adapt to more awareness of the built environment's impact on both human health and natural resources.”

Analyzing the building needs of these different climates as well as the local utility infrastructure is critical. Not only does it help us discern the right technology on the electrification side, but, even more importantly, in doing so, it leads communities to think beyond the individual building and look at district-type technologies such as district ground coupled energy plants or community solar systems. District approaches extend beyond energy to other systems, such as storm water management, water reuse and ecosystem services. Moreover, this approach opens up the potential to combine a much deeper understanding of how a building operates with controls that include utility data, predictive modeling and data collection, weather forecasts, and tenant usage patterns that will lead us to operate buildings in a more energy efficient way. To give a practical example, in commercial buildings, operators are looking to track typical occupancy patterns and building system responses, such as the length of time it takes to get a building up to temperature in the morning. Sensors can provide input to improved analytics, allowing hours of unnecessary equipment run time to be shaved off, cutting costs and emissions at the same time.

“There is undeniably a strong momentum for sustainability around the globe that derives from a broad consensus of the urgent necessity to address climate change. The pitfall is that all of these activities, especially when translated into regulations, create a perception that the problem of how we address sustainability in the built environment is solved.”

While all these advancements are ultimately working toward mitigating climate change, it is already a reality; thus, climate change is an increasingly pressing design and development driver. Resiliency planning recognizes that extreme weather events are going to happen much more frequently and

implements physical building infrastructure to protect against catastrophic events to allow buildings and communities to recover with minimal damage and downtime. In the best case, like in New York City’s plans for the Big-U shoreline protection of lower Manhattan, resiliency infrastructure will serve both functional needs while providing exciting new urban spaces for neighboring communities.

We are living in a world where we spend most of our time indoors surrounded by a manmade environment, yet we still don’t understand many facets of how this environment affects us. We need to recognize the impact of materials on our health and wellbeing. There is an enormous amount of work to be done to really understand the toxicity of the built environments we create. We can start by re-engineering products to remove some of the worst offenders, and we need to develop clear reporting protocols and metrics in terms of complete supply chains to start making truly informed decisions. We need to obtain a deeper knowledge of what’s happening across the entire lifecycle of a product and the associated health, environmental and social impacts, not only during use, but also before and after.

Australia is on the forefront of looking at social justice impacts in the manufacture of products. As the country imports goods from surrounding nations such as Indonesia, Malaysia or China, where labor practices are often questionable, people are starting to look closer at the social justice profile of different products to inform socially responsive procurement decisions. This effort goes hand-in-hand with our increasing ability to collect, share and analyze data on a large scale for the many products we’re using in the built, manmade environment.

It is encouraging to see the traction of environmentally responsible design picking up in different parts of the world despite varying government priorities and progress speeds. Europe is, at this point, driven by a larger regulatory environment, established at the European Union level with member state efforts to enforce clear action on climate change and human health issues. These are large commitments, and as a result it’s a slow-moving train. But there are clear targets and a lot of momentum that creates certainty for large investments in technology, policy and infrastructure development.

In the United States and other places that don't have a strong high-level policy commitment to environmental issues, we are seeing a lot of activity at the local level which, while hopeful, is fragile and susceptible to changing political agendas. There are a lot of very ambitious initiatives and fast-moving activities, but often only on the city or community scale. The silver lining is that this smaller scale allows for more experimentation and a more regional response.

Like the United States, Australia has fallen behind, but it's starting to catch up in certain areas. Unfortunately, it is in some ways hampered by the same issues: there is no strong federal plan, guidance or long-term trajectory, and as a result, a lot of it is happening at the local or grassroots level.

In Asia, we see a more heavy-handed top-down approach than in the EU. Certain goals and standards are set in places, like Singapore or China, that become national targets. While providing very strong direction, the concern here is the rigor of implementation at the local level.

There is undeniably a strong momentum for sustainability around the globe that derives from a broad consensus of the urgent necessity to address climate change. The pitfall is that all of these activities, especially when translated into regulations,

create a perception that the problem of how we address sustainability in the built environment is solved. As a result, development and design often becomes a game of how to achieve such regulatory requirements in the cheapest, simplest way instead of trying to go above and beyond.

We are still far away from a truly sustainable world and a sustainable built environment. The challenge is to inspire clients not to think that by meeting some form of legal minimum benchmark, they've solved the problem or met their commitment. This can happen at all different scales of building, from the very large, like in our Gardens by the Bay project in Singapore, to the small and precious, like our net-zero, Living Building certified, Frick Environmental Center in Pittsburgh. The goal must be to motivate clients to explore truly innovative and exciting ways of creating buildings that are leading our field forward in shaping a more sustainable, better world for all.

Nico Kienzl is a founding director of Atelier Ten's U.S. sustainable design consulting practice, member of Atelier Ten's International Board and a USGBC LEED Fellow. Atelier Ten is an award-winning global engineering and design consulting firm with offices in the UK, North America and Australasia.

At DesignIntelligence, we are constantly taking the pulse of A/E/C leadership on the things that matter, the things that are important to the industry. From talent engagement to how global geopolitics affects business, from new technology to leadership transitions, we are always working to move the A/E/C industry forward, for the betterment of all. For this edition, our first “deep green” issue of *DesignIntelligence Quarterly*, we asked several A/E/C leaders: “What is the current state of sustainability and regenerative design?” Here are some of their responses.

“To state it simply, the current global environmental ‘pickle’ that we are in is of our making, it is of our design. How we address this awkward truth is our obligation to future generations. A generous spirit, and a cooperative application of creativity, joy, intelligence and innovation will create the truly sustainable, prosperous, beautiful and regenerative future we seek. This is the best of design. This is the work of architecture. This can no longer be a matter of debate, but one of action. This is our work and its impact matters.”

Rand Ekman, Principal
Chief Sustainability Officer
HKS, Inc.

“As the world moves toward the adoption and implementation of the UN’s Sustainable Development Goals, we are being asked to recognize the need to achieve both positive economic outcomes for all and optimal health for the ecological and environmental systems that support human life. This, in the face of increasing global population, means that there is enormous work to be done to get to sustainability. Things that would once have been well within the carrying capacity of the planet are no longer so—getting to sustainability means doing much more with less—less energy use and carbon emissions per head, and, perhaps most critically, less stuff.”

Fiona Cousins
Arup Fellow | Digital Executive

“For the last decade, we have seen a strong conversation around the relationship between humans and their built environments—health, wellness, and productivity, and more recently a surge of interest in issues of equity and resiliency. Long-term thinking is more critical than ever, and in order to get the public on board, we need to change the conversation from ‘Saving the Planet’ to ‘Ensuring our kids and grandkids have a healthy long-term home’.”

David W. Goldberg
President
Mithun

“I’m optimistic and energized with where things seem to be heading right now. Having been working in this space for 15 years, first as a young woman in the architecture profession and now on the construction side of the table, there is a heightened sense of urgency and a strong new movement toward collective impact across the A/E/C industry. I think some of this has to do with us getting smarter about utilizing data to our advantage, in both understanding where the biggest opportunities are for reducing our buildings’ footprints and enabling us to educate our clients about the environmental impacts of their buildings using facts and figures vs. stories and anecdotes. I also feel as though those in the A/E/C community are realizing that sharing the responsibility and leveraging each other’s knowledge, expertise and opportunities for sustainable and regenerative impact pushes the entire building industry forward, and that market transformation is more important than individual gain. It’s an exciting and important time, and I truly believe over the next 15 years we will see tremendous leaps in the sustainable and regenerative strategies implemented in all of our work.”

Stacy Smedley
Director of Sustainability
Skanska USA Building

2018 SUSTAINABLE, RESILIENT AND REGENERATIVE DESIGN RESEARCH PROJECT

Standards, Barriers, Ideas and Initiatives

Methodology

Overall goals and approach

The goal of the research project featured in 3Q 2018 *DesignIntelligence Quarterly* was to collect insights and information from top architecture, engineering and construction (A/E/C) industry experts on important issues in sustainable, resilient and regenerative design. Issues that DI Research wished to investigate included:

- The most effective standards or systems in sustainable, resilient and regenerative design
- Key barriers on the firm and industry level to the practice of sustainable, resilient and regenerative design
- The most compelling messages to promote sustainable, resilient and regenerative design
- The most effective ideas, programs, initiatives and interventions that firms can engage in order to benefit the natural environment

Information for the research presented in this edition was drawn from three sources:

1. A hands-on exercise conducted at each of five Action Forums conducted by the DI Research group of DesignIntelligence
2. A survey administered to participants of each Action Forum
3. An online survey that matched the paper survey

About the Action Forums

Between April 24, 2018 and August 2, 2018, the DI Research group of DesignIntelligence held a series of invitation-only workshops to share ideas and discuss actionable steps that the A/E/C industry can take to make faster progress in having a greater positive impact on the natural environment. Invitees included leaders in sustainability, resilience and regenerative design in professional practices and organizations in architecture, engineering, construction or design; academic institutions; nonprofits; or government. The strong majority of participants were professional practitioners.

The forums included speakers, panel discussions, group discussion, a survey and an interactive workshop exercise, which is described below. More than 85 leaders attended, representing 48 organizations. Forums were conducted in Los Angeles, Chicago, New York, Boston and Seattle.

Action Forum exercise description

Participants in the exercise were asked to consider initiatives, actions or approaches that their firm or organization could undertake to benefit the natural environment through their work. Actions either inside the firm (such as starting a sustainability lab) or outside in the marketplace (such as a developing a firm-wide focus on low carbon materials) were allowed.

DI Research
Action Forums
April 24 - August 2



85
LEADERS

48
ORGANIZATIONS

Each session (one per city) included approximately 15–25 people who were divided into smaller working groups of four or five participants. Groups were provided a paper matrix that was approximately 36 inches square. The horizontal axis represented achievability (low to high) and the vertical axis represented impact (low to high).

Participants within small groups were given approximately five minutes to generate any number of ideas for initiatives, actions or approaches on their own. Participants were asked to use one sticky note for each idea they generated. Groups were given approximately 25 minutes to discuss the ideas that individual members had recorded on sticky notes and collectively decide the degree of achievability and impact of each idea.

Groups decided through discussion whether and where to place the notes on the quadrant diagram based on a collective assessment of each idea's potential for achievability and impact. Each group posted their completed matrix on the wall and a spokesperson reported out the group's most important discussion points and insights. Participants from other groups were provided the opportunity to ask questions.

Action Forum exercise analysis method

Each idea expressed on a sticky note was recorded and coded, or assigned to a broad theme, and marked as to the location it appeared on the matrix. Themes or codes were then tabulated to establish the frequency with which each theme occurred. The location on the matrix of individual ideas and themes were then analyzed to find trends in achievability and impact.

Online survey participants

Answers for the online survey were collected between June 11, 2018 and July 16, 2018 using SurveyMonkey. The sample for the online survey was recruited via email from the DesignIntelligence database of leaders in sustainability, resilience and regenerative design. Attendees of the Action Forums were not solicited to participate in the online survey. The online survey garnered a 17.9 percent response rate.

A total of 86 participants in the online survey came from 64 different professional practices and organizations in A/E/C, or design; academic institutions; nonprofits; or government.

Action Forum survey participants

Between April 24, 2018 and August 2, 2018, the DI Research group of DesignIntelligence surveyed participants in the organization's Action Forum live event series. Participants in the invitation-only events recruited from the DesignIntelligence database of leaders in sustainability, resilience and regenerative design in professional practices and organizations in architecture, engineering, construction, or design; academic institutions; nonprofits; or government. A total of 86 paper surveys were collected.

Survey questions

The online and Action Forum surveys asked five identical questions about respondents' views on the following:

- The most effective measure or standard of sustainable/resilient/regenerative design
- The degree to which their firms or organizations designed projects to the most effective measure or standard (by percentage of projects)
- Challenges inside their firms that inhibit the firms from designing the majority of projects to the most effective standard
- Challenges in the industry that inhibit the firms from designing the majority of projects to the most effective standard
- The most effective messages/themes to help promote sustainable/resilient/regenerative design

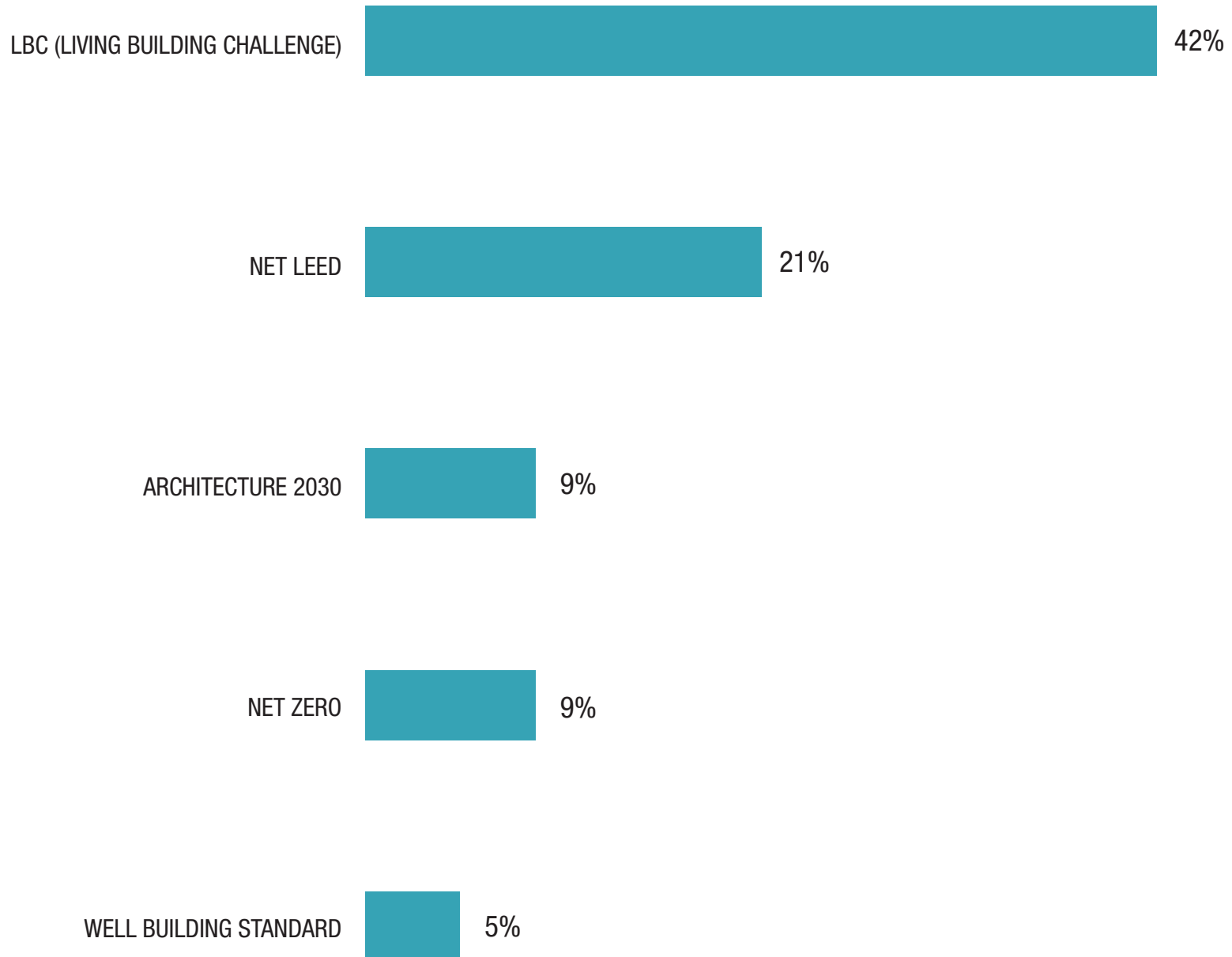
In both the online and Action Forum surveys, participants were given the opportunity to write in any answers that were not provided from set lists.

ONLINE & IN-PERSON SURVEYS

Invited experts offer their perspectives on important, pressing issues in sustainable, resilient and regenerative design.

ONLINE & IN-PERSON SURVEYS

What do you feel is the most effective measure or standard of sustainable/resilient/regenerative design?
(examples: LEED, Living Building Challenge, etc.)



Observations and Insights

LBC and LEED in the Lead

Question 1 is “What do you feel is the most effective measure or standard of sustainable/resilient/regenerative design? (examples: LEED, Living Building Challenge, etc.)” In both the online and in-person Action Forum surveys, the notable majority of responses indicated two standards as the most effective: LBC (Living Building Challenge) and LEED. Together these systems made up 62 percent of all responses. At 41.8 percent, the Living Building Challenge garnered almost exactly double the 20.7 percent earned by LEED.

The LEED system, which is now in version 4.1, was unveiled in 2000 by the U.S. Green Building Council (USGBC) *new.usgbc.org/about*. According to the USGBC, there are more

than 94,000 projects using LEED and more than 2.4 million square feet is LEED certified every day. LEED is in over 165 countries and territories. *new.usgbc.org/leed*

The Living Building Challenge (LBC) was created in 2006 by the nonprofit International Living Futures Institute, which claims that “The Living Building Challenge is the world’s most rigorous proven performance standard for buildings.” The standard includes 20 imperatives such as urban agriculture, habitat exchange, biophilic interior environment and more. *living-future.org/lbc/*

“LEED was a good and necessary step, but it is not enough. It became a ‘check the box’ game. Living Building Challenge is aspirational and motivating because it is so hard to achieve in normal practice.”

Action Forum survey respondent

“LEED has transformed the market with its recognition, but all of these are important. LBC comes closer to regenerative design.”

Action Forum survey respondent

“I’ve chosen to answer this based on the most ‘effective measure’ of aspirational outcomes, LBC. It’s different altogether from what I would select as the most ‘effective standard’ most likely to achieve the greatest incremental improvement in the most projects. LBC is clearly the most likely to break barriers and change thinking, but definitely not the most likely to achieve broad uptake.”

Online survey respondent

“Buildings and their sites become complicated systems, especially when placed in context. All measurement tools have some weaknesses.”

Online survey respondent

“There is no silver bullet, they all have their place in forwarding sustainability.”

Online survey respondent

“I believe there is no one measure that fits all—various components of each are applicable. LEED and LBC may be the closest measure(s) at the moment.”

Action Forum survey respondent

“I find there are different benchmarking systems for each of those issues, and drawbacks/criticisms with each. Arguably LBC or WELL are where we need to be heading.”

Action Forum survey respondent

Many respondents wrote in the comments that they felt LBC is the most effective standard based on being the most stringent and comprehensive, but LEED is effective and valuable because it is the most pervasive.

The next largest set of responses for effective standards were Architecture 2030 and Net Zero, each of which comprised 8.7 percent of the total.

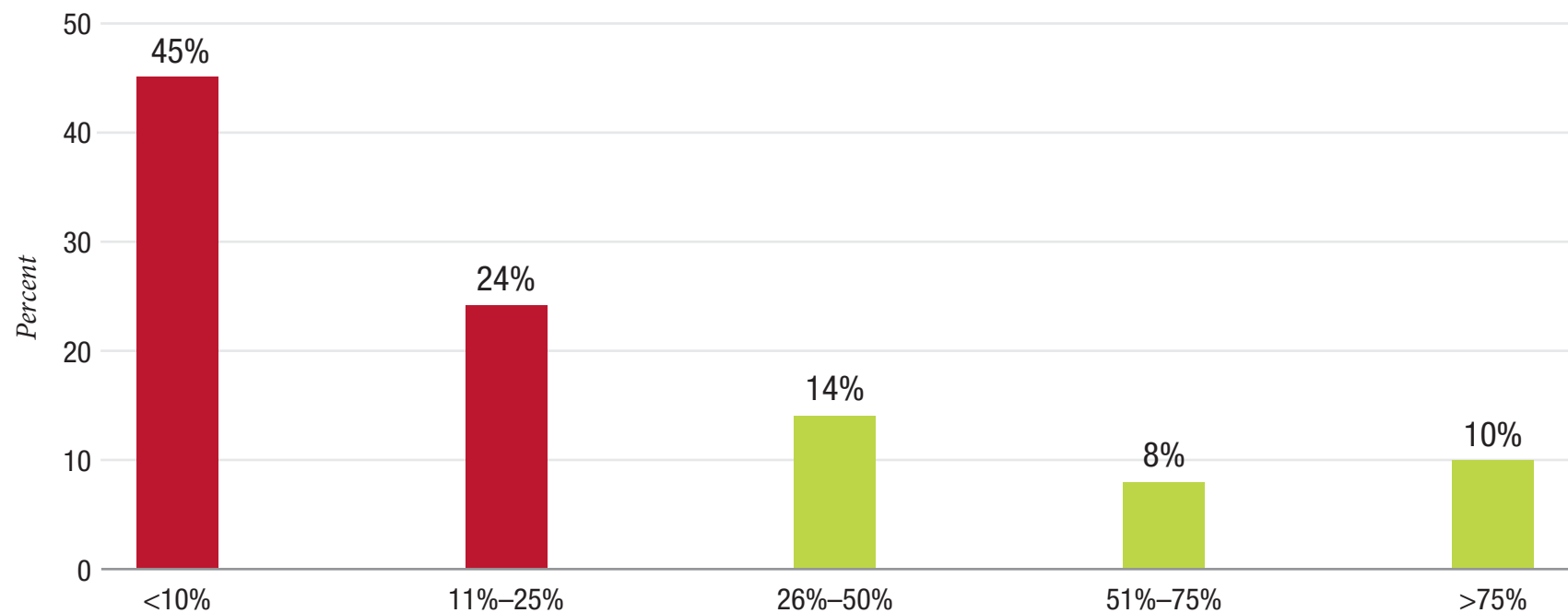
No Perfect System

Based on their comments to the survey question, respondents seemed to feel that there was no perfect standard, and that perhaps a combined approach is best.

At least one respondent felt that not only was there no perfect system, but also that “There’s a difference between the most comprehensive standard to ACHIEVE the sustainable/resilient/regenerative outcomes, and the one most likely to be implemented.” Perhaps the key to that “comprehensive standard that is most likely to be implemented,” as another survey participant noted, is “the one we can sell to our clients based on their perceptions.”

ONLINE & IN-PERSON SURVEYS

In your estimation, what percentage of your firm’s projects meet the most effective measure or standard of sustainable/ resilient/regenerative design?



Observations and Insights

Room for Improvement

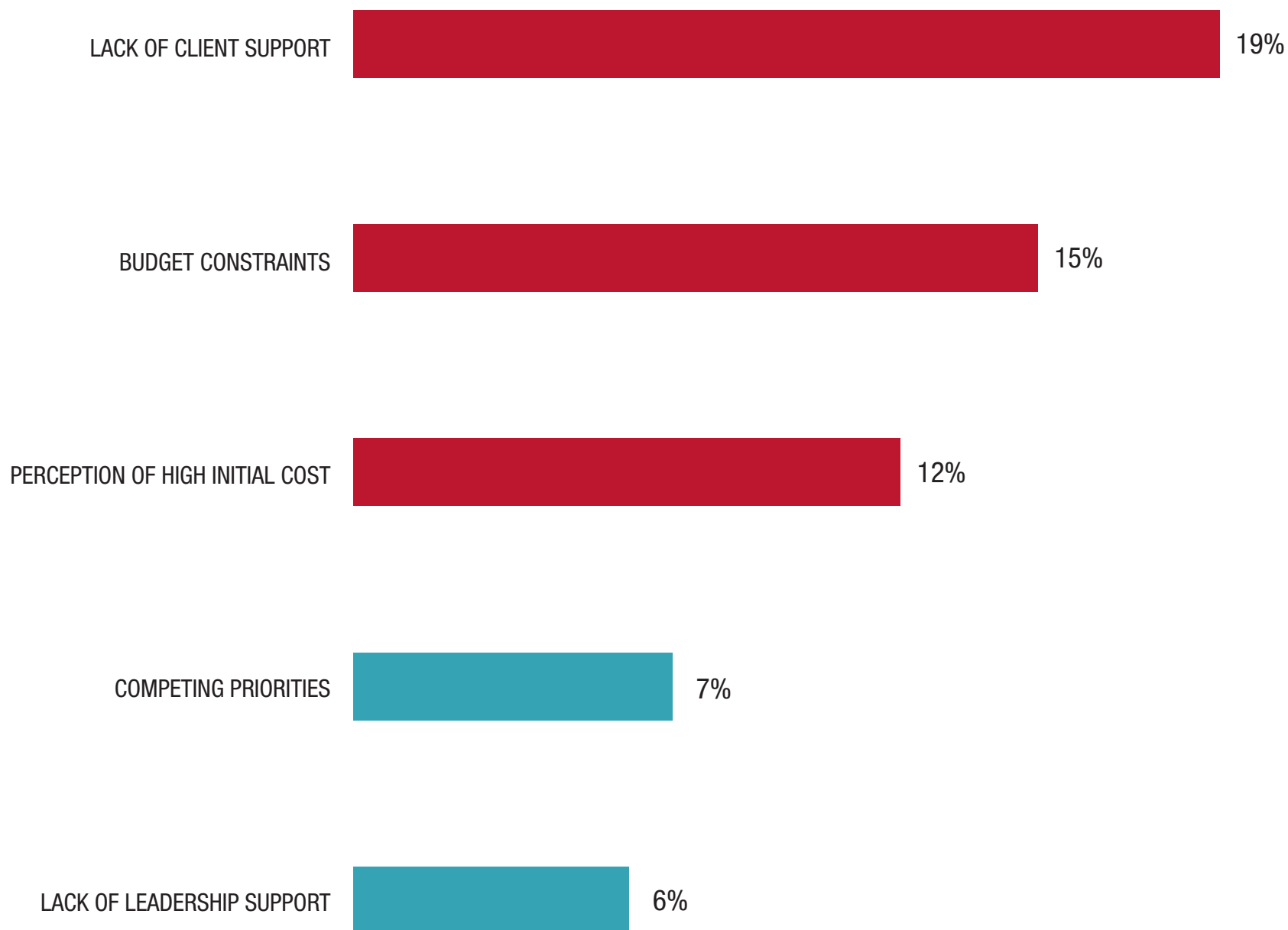
In question two, nearly 70 percent of responses fell to the two lowest categories, indicating that a relatively small percentage of projects designed and delivered by firms represented in the survey use the firm’s highest standard of sustainable, resilient or regenerative design. In other words, the strong majority of firms achieve the most effective standard of sustainable, resilient or regenerative design in 25 percent or fewer of their projects.

Clearly, respondents did not feel their firms were meeting their highest standard of green practice and expressed the reasons why in the following questions.

70%
OF RESPONSES FELL
TO THE TWO LOWEST
CATEGORIES

ONLINE & IN-PERSON SURVEYS

What are the top three challenges inside your firm that inhibit it from designing the majority of projects to the most effective standard (“deep green”)?



Observations and Insights

Convergence of Inside and Outside

Though the survey asked separate questions about the internal and external barriers to “deep green practice” (designing and delivering the majority of projects to the most effective standard), respondents provided answers that blurred the lines between inside and outside. Taken together, the two questions yield interesting insights on the factors that leading practitioners feel hamper their work.

The theme that ran throughout the two questions was clear and consistent: economic considerations were seen as the biggest barriers to deep green practice.

Question Three: Economic Barriers

In question three (“What are the top three challenges inside your firm that inhibit it from designing the majority of projects to the most effective standard [“deep green”]), which is ostensibly the question covering internal barriers, the top five response categories covered 58.1 percent of the total. Many of the barriers cited by respondents related in some way to financial or economic considerations.

Of those top five responses, “lack of client support,” though it sounds more like an external issue, was listed as the biggest single challenge with 18.9 percent of the total. The category of “budget constraints” was 14.8 percent and “perception of high initial cost” was 11.5 percent. If we assume “lack of client support” is financially based, then economic barriers would account for 45.2 percent of all responses to question three.

Comments from respondents to question three supported the strong presence of economic barriers throughout question three.

“We are limited by the market and our ambitions to grow (or maintain our size). The highest standard is only sought by rare clients.”

Online respondent

“Budget constraints: Fee splits do not support the efforts needed in early design phases to design to meet these standards.”

Online respondent

Some economic barriers were based on misperceptions, as reflected in one comment from an Action Forum survey respondent: “Lack of understanding that high performance design can be cost neutral; (it) doesn’t have to cost more.”

19%
LACK OF CLIENT
SUPPORT IS BIGGEST
CHALLENGE

15%
BUDGET CONSTRAINTS
IS SECOND BIGGEST
CHALLENGE

12%
PERCEPTION OF HIGH
INITIAL COST IS THIRD
BIGGEST CHALLENGE

Question Three: Mixed Reviews of Own Performance

Other challenges cited by respondents to question three were clearly focused within the firms.

“Competing priorities,” which garnered 7.4 percent of total responses, was one of the five most frequently cited challenges and highlighted the difficulty of balancing green goals with myriad other considerations in professional practice.

The category “lack of leadership support,” when combined with “lack of knowledge/talent within firm” and “not prioritized within firm” (which are not shown on the accompanying bar chart but were tied for sixth place with 5.2 percent each), nearly 16 percent of all total responses related to issues of leadership or capability within the firm.

Interestingly, other responses that relate to internal capabilities such as “staff capacity constraints” and “inadequate processes within firm” garnered only 1.1 and 2.2 percent, respectively.

Comments from survey respondents were sometimes cuttngly direct in assessing internal barriers in firms.

Other survey respondents were less trenchant, but still highlighted significant issues within firms.

“Leadership does not want to commit to a set of principles since there is a fear that we will have to relax them when times are tough. Plus, (practitioners) are not primarily motivated by ethics.”

Action Forum survey respondent

“People who design don’t always know how to use analysis tools and understand the output, so they can optimize design.”

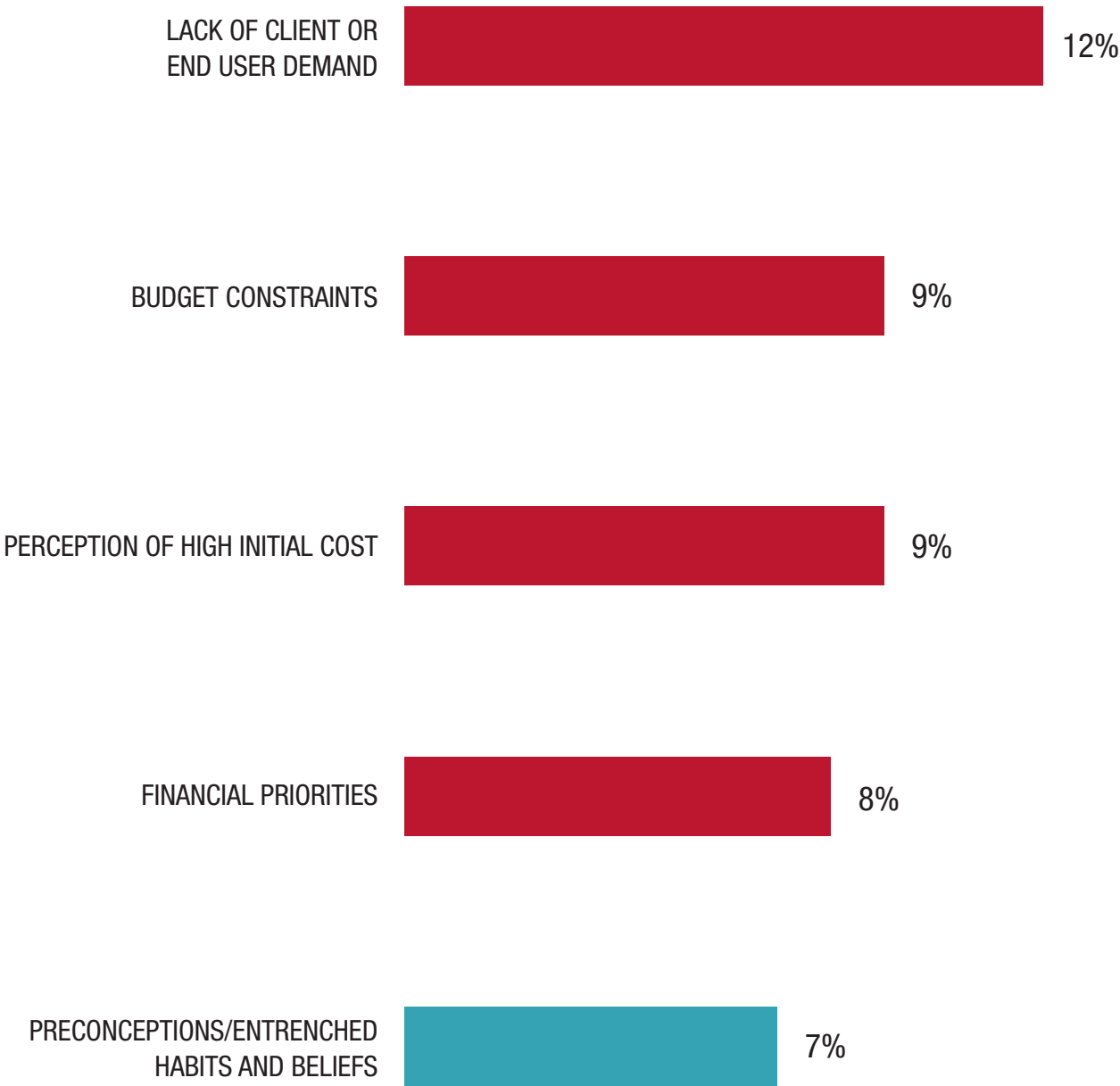
Action Forum survey respondent

“(Designing the majority of projects to the most effective standard is) also not prioritized by many designers–(it is) often treated as an add-on rather than a facet of good design. They are held back by poor knowledge of the concepts, meaning that there is not early integration.”

Online survey respondent

ONLINE & IN-PERSON SURVEYS

What are the top three challenges in the industry that inhibit your firm from designing the majority of its projects to the most effective standard (“deep green”)?



Question Four: Economics Again

Question four (“What are the top 3 challenges in the industry that inhibit your firm from designing the majority of its projects to the most effective standard [“deep green”]?”) focused on barriers to deep green practice in the industry, and was even more obviously focused on economics than question three.

Four of the top five barriers in the industry cited by participants related in some way to financial considerations or economics. Taken together, lack of client or end user demand, budget constraints, perception of high initial cost and financial priorities made up just over 37 percent of all total responses.

Notably, the sixth most frequently cited barrier, which is not included on the earlier chart, was not exclusively financial but included an economic dimension: “missing regulatory and market pressure.”

Some comments that included financial or cost factors portrayed a more mixed set of barriers.

Additional participant comments included more widespread industry-based barriers.

“Checklists tend to suppress innovation and experimentation. Industry is still too focused on checklists and compliance. Clients who actually do not want to measure results.”

Forum survey respondent

“Lack of post (occupancy) connection between design + performance, learning from past projects.”

Action Forum respondent

“Lack of leadership. Don’t let clients be the only ones to define sustainability goals.”

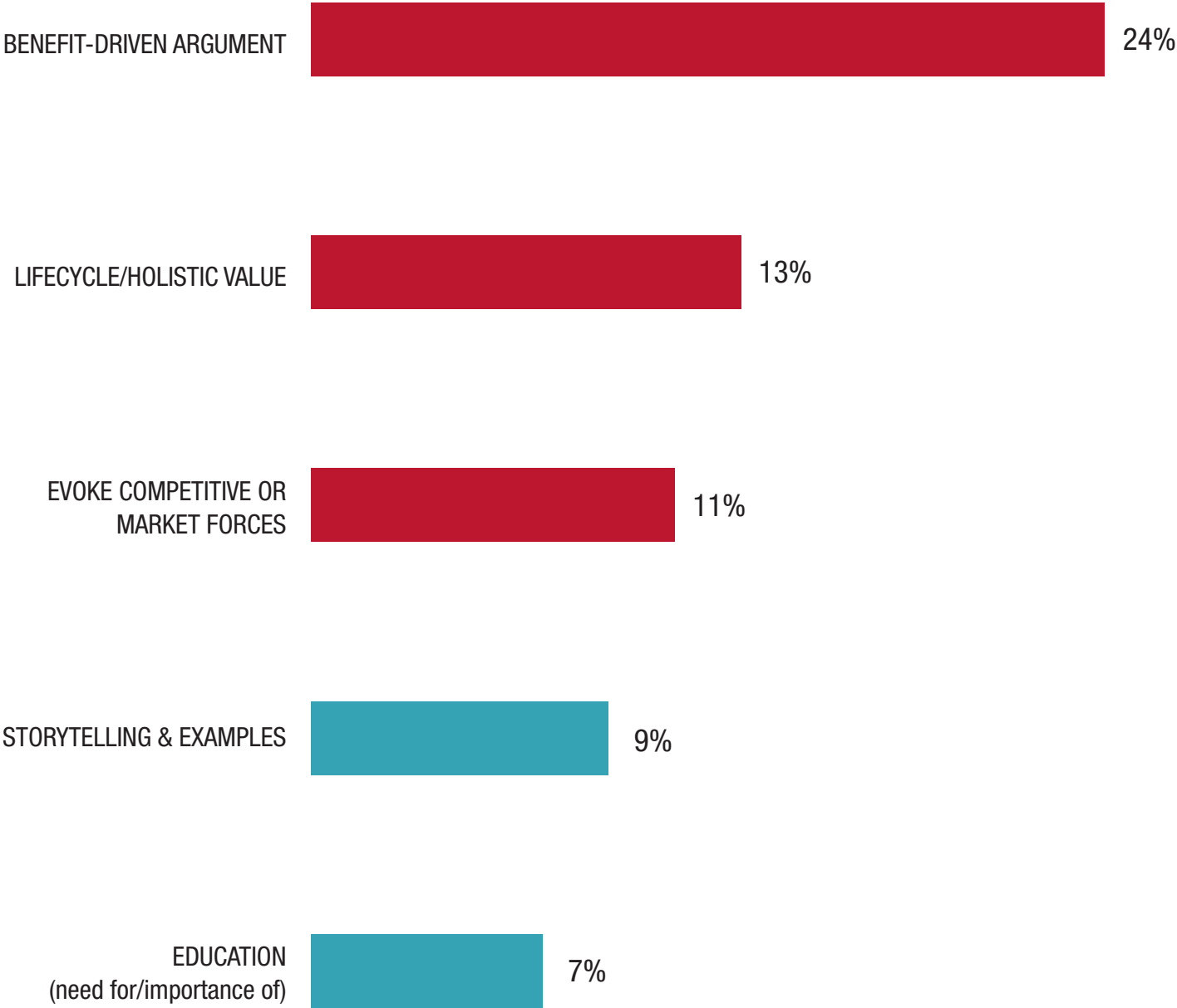
Action Forum survey respondent

“Lack of conviction combined with perceived cost impacts, risk, and the idea that relative to a particular facility, sustainable/regenerative is not mission-critical. It’s good for the collective but the benefits to the individual are less clear and usually hard to quantify.”

Online survey respondent

ONLINE & IN-PERSON SURVEYS

What are the most effective messages/themes to help promote sustainable/resilient/regenerative design?



Observations and Insights

Another Type of Green

In question five (“What are the most effective messages/themes to help promote sustainable/resilient/regenerative design?”), financial and value arguments were a strongly consistent part of what many respondents felt made the most persuasive case for sustainable, resilient and regenerative design. In the words of one online survey respondent, the most effective communication is composed of “economic arguments specifically tied to occupants of building and primary financial goals of client.”

The top three themes, which together comprised nearly half of all responses, were either all or in part focused on economic benefits, market forces or holistic value.

“Evidence-based practices that can show measurable value that can be added to projects.”

Action Forum survey respondent

“Must be a business decision benefit—has to do more than be the ‘right thing to do.’”

Action Forum survey respondent

Respondents provided comments that echoed the importance of framing green projects within a financial framework.

Comments to the survey suggested a strong turn away from negative or fear-based arguments in favor of positive or benefit-driven messages. In the words of one Action Forum participant in Los Angeles: “People don’t want to hear any more about the polar bears.” Together, “climate change” and “dire consequences of wrong action or inaction” were the only two explicitly negative answer themes, and together they comprised only 9.1 percent of the overall total of effective arguments.

“It’s not about being sustainable.
Sustainability is an outcome.
Sustainable design is a tool to
achieve business gain—that’s it.
No ideology.”

Action Forum survey respondent

“I think showing clients that they can take a true leadership position in a manner that has exponential impact is most important. Institutional clients are the ones that will adopt now (colleges in particular), and they care that the benefits extend beyond the project to the wider community.”

Online survey respondent

“Health and wellbeing; targeted strategies that are relevant to the client and their mission.”

Online survey respondent

“Resilience taps into our instinctual desire for stability. If we create places that are insulated from drought, escalating power costs, and are better environments—then it is a winning formula.”

Action Forum survey respondent

Striving Beyond Economics

However, not all benefit-driven arguments were financial. Respondent comments revealed a notable strain of aspirational or idealistic themes.

One respondent reminded us of the aspiration for a more transcendent benefit: “We are not designing just buildings, we are designing futures.”

Another respondent reminded us that we must consider the health and well-being of a building’s occupants. And many

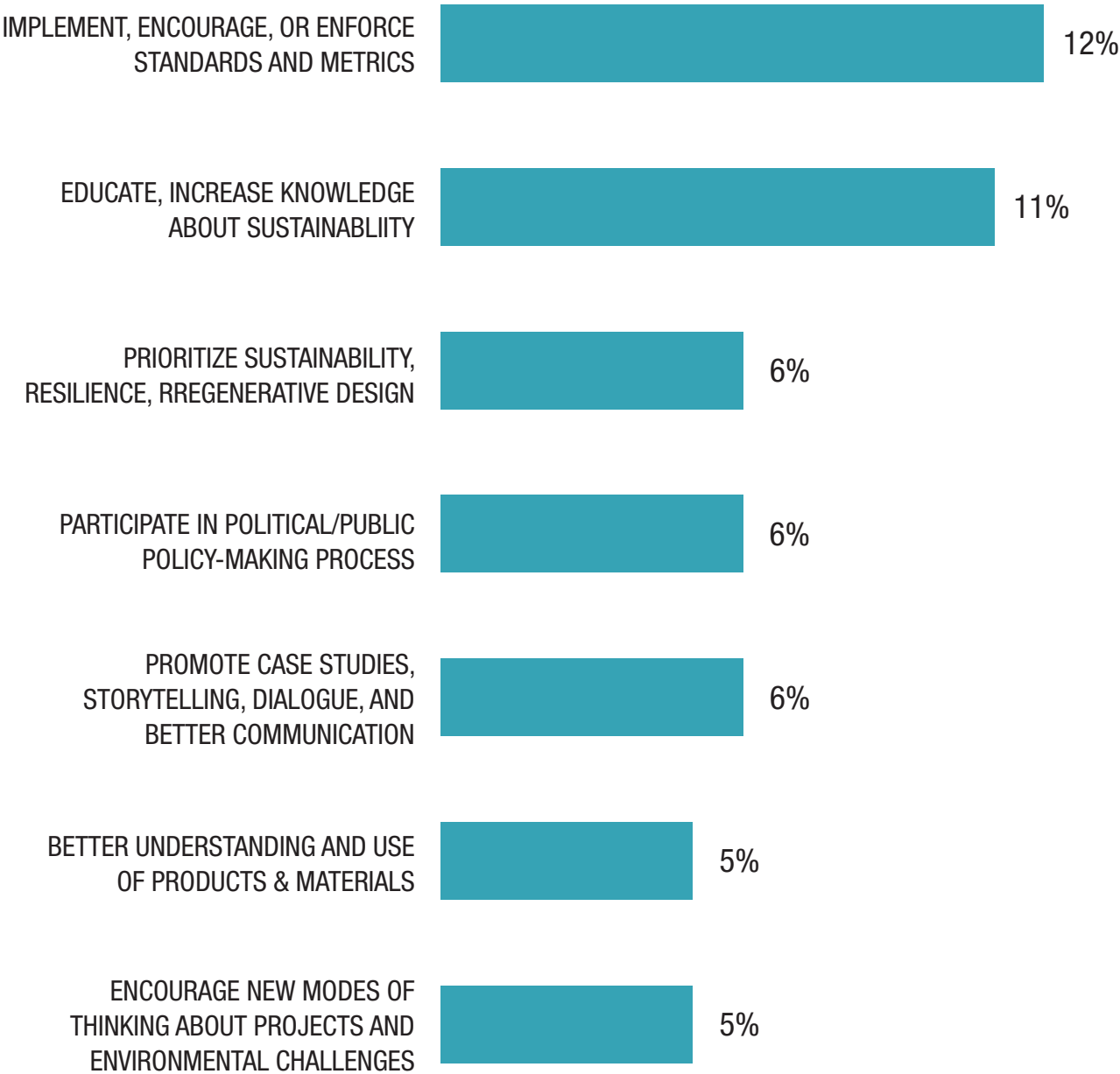
respondents felt that “storytelling and examples,” especially personal examples, would be helpful in building effective messaging that would help promote sustainable, resilient, regenerative design. “Education” (the need and importance of) responses and “Display knowledge and passion” responses combined with “Storytelling” can offer a powerful resonance within audiences to move toward regenerative design to the betterment of our world.

IMPACT & ACHIEVABILITY

Industry experts participating in DI Research Action Forums offer their perspective on the most effective organization/firm-level ideas, programs and actions for sustainable, resilient and regenerative design.

IMPACT & ACHIEVABILITY

Most Frequently Occurring Themes



Frequency of Themes

What Participants Said

The sustainability, resilience, and regenerative design leaders who took part in the Action Forum group exercise were given the mandate to work individually and in teams to find the most impactful and achievable ways that firms can solve environmental challenges. The groups generated 388 ideas that were condensed into 33 themes. The scale and complexity of the problem at hand, and the myriad options for how to approach it, likely contributed to the broad range of ideas put forward.

Participants offered ideas that challenged A/E/C organizations to stretch beyond their traditional roles as well as approach green practice in new and creative ways.

The top seven themes accounted for 51.3 percent of the total number of ideas that DI Research collected.

Of these, the most commonly occurring theme was **“implement, encourage, or enforce standards and metrics,”** which captured more than 12 percent of all ideas. Most of the ideas that fell under this theme related to the voluntary standards for projects, better or more frequent use of existing systems, or setting and sticking to internal goals. Many of the ideas suggested exceeding the client’s environmental mandates or the requirements set by applicable codes. Examples included:

- “LBC/Carbon neutral as baseline for all firm projects by 2030.”
- “Post occupancy as a firm standard—know better, do better.”
- “Define minimum in-house goals for all projects (whether or not client supports)”


The next most frequent theme, which encompassed just over 11 percent of the ideas expressed, was **“educate, increase knowledge about sustainability.”** In their ideas, participants focused on the audiences that A/E/C professionals needed to reach: owners, peers, students, design and delivery partners, building users, and the general public. Throughout this theme is the notion that professionals should not only use

deep green knowledge in designing and constructing the built environment, but also reach beyond the bounds of their practice to function as an information hub and spread what they know.

“Prioritize sustainability, resilience, regenerative design” was the third most common theme. Ideas that fell under this theme varied from recommendations on internal firm policies that would affect project goals and performance, as well as the materials specified for construction. Empowering others within the firm was a key subtheme, and many of the participant’s recommendations promoted the creation and maintenance of standards as a way of showing that green practice is a priority. Ideas from participants included:

- “Turn down or reject a project if it lacks ecological goals”
- “Conduct a total impact design (what we are calling deep green) charrette for every budget”
- “Strategic plan to say who do you want to work with and why”
- “Mandate procurement of material attributes that result in lower embodied carbon”

In the fourth most frequent theme, **“participate in political/public policy-making process,”** participants promoted the idea that green-minded firms can have a greater effect on environmental challenges by venturing outside the bounds of their role designing and constructing the built environment. Through lobbying and influencing codes and laws on the local to federal level, firms can help fashion the stick that compels the market to make more Earth-friendly choices. Ideas within this theme included ways in which firms could incentivize

388  **33**
IDEAS THEMES

employees to get involved in politics and policy, as well as act collectively in lobbying on local to national levels.

Like other themes, **“promote case studies, storytelling, dialogue, and better communication”** called upon firms to build a larger platform of influence by engaging in activities that are not strictly tied to design and construction. Ideas from participants included ways in which professionals could be more effective public spokespeople, from learning to step into a somewhat less familiar domain (“communication training”) to communications best practice (“speak in the language of the audience you seek to convince”). Building benefit-driven and economic arguments was a notable sub-theme.

Examples included:

- “Sell (be the first) use the fact that you care as your brand. Market it. It will bring you more money.”
- “Be brave with ‘bread & butter’ clients: tell them (on their own terms) the benefits”

The sixth most common theme, **“better understanding and use of products and materials,”** focused on two types of ideas: carbon reduction (especially embodied carbon), and the creation of systematic guides for specifying greener materials. Interestingly, approximately 85 percent of ideas within this theme fell outside of the “high impact, high achievability” quadrant. Surprisingly, many of the ideas scored high on achievability but low on impact, suggesting that participants believed changing practices regarding materials may be less helpful than other types of initiatives. The most notable exceptions pertained to embodied carbon.

“Encourage new modes of thinking about projects and environmental challenges” was one of the broader themes to emerge from the Action Forums (i.e., the ideas within it tended to be more diverse than in other groupings).

Examples, which ranged from changes of mentality to tactical approaches, included:

- “Give voice to younger staff who may have more skills.”
- “As a firm we need to get out of the mindset that sustainability means cost.”
- “Support grassroots initiatives.”
- “Roll up the ratings”

- “Push & explore new ideas/strategies even if they seem crazy”
- “Invest in R&D (in) DAC (Direct Air Capture) material manufacturing”

One of the most highly rated (impact and achievability) ideas was labeled the “Start with zero approach.” Firms invert the thinking behind many rating systems—assuming harm and working on mitigation—instead beginning with the assumption of zero impact and minimizing what is added back in by design decisions, materials specifications, and construction methods.

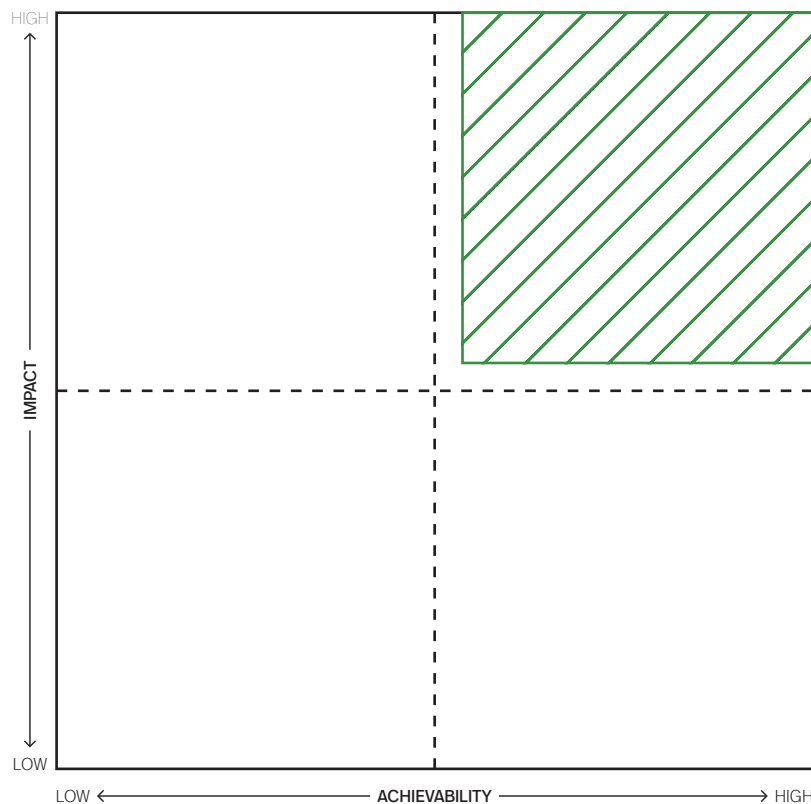
Impact and Achievability

Top Third of Ideas

Just over 10 percent of all ideas put forward by Action Forum participants rated solidly in the highest third on achievability and impact scores, which were determined by the placement of individual ideas on a matrix during the group exercise. Because of the combination of high impact and achievability, these ideas can be regarded as the most effective overall.

The list of top third highest impact/most achievable ideas, when considered by theme, overlapped considerably with the most frequently occurring themes—likely because of the number of ideas in each thematic category. The most notable addition was the category or theme of “encourage new modes of thinking about curriculum and education.”

Overall, ideas that tended to rise to the top of the impact and achievability ratings echoed thematic trends found elsewhere in the data. A/E/C professionals can (or should) work outside of traditional design and construction roles to affect change, whether media-savvy public spokespeople, or as engaged political advocates who influence public policy. A/E/C firms can lead efforts to measure performance in new ways, establish new standards, and proactively design and build greener projects, whether or not they are compelled to do so by outside rules.



41

UNIQUE IDEAS IN HIGH IMPACT/
HIGH ACHIEVABILITY QUADRANT

8

THEMES

Educate, increase knowledge
about sustainability

Implement, encourage, or enforce
standards and metrics

Participate in political/public
policy-making process

Promote case studies, storytelling,
dialogue, and better communication

Prioritize sustainability, resilience,
regenerative design

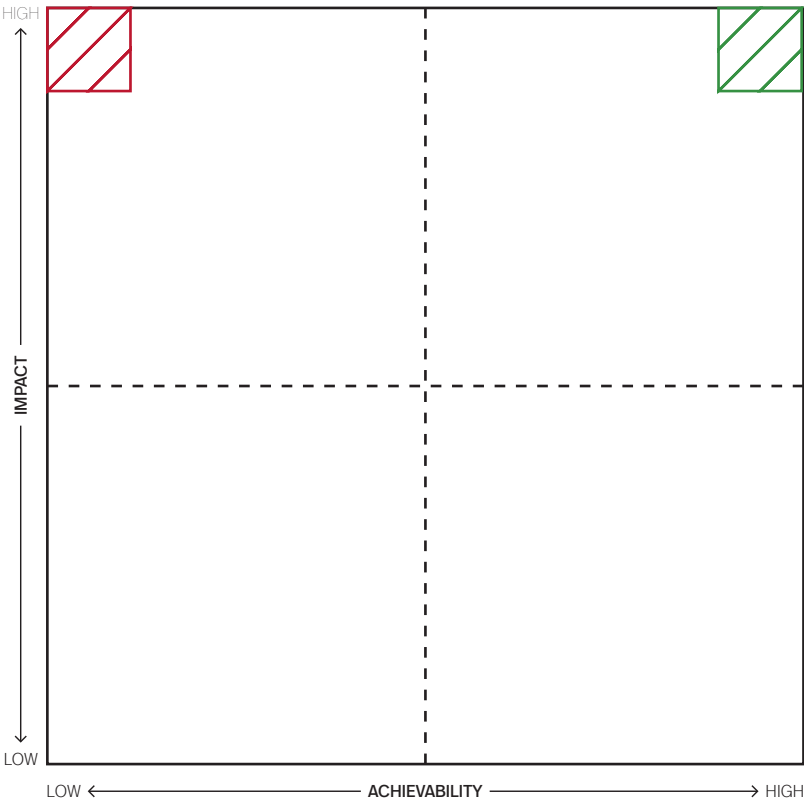
Encourage new modes of thinking
about projects and environmental challenges

Better understanding and use
of products & materials

Encourage new modes of thinking
about curriculum and education

**HIGHEST IMPACT
AND LOWEST
ACHIEVABILITY**
MISSION IMPOSSIBLE

**HIGHEST IMPACT
AND HIGHEST
ACHIEVABILITY**
TOP OF THE TOP



Top of the Top: Key Ideas

There were eight terms that scored the highest possible in both impact and achievability (a “10/10” in both categories). Half of the ideas related to either communication or new modes of thinking, and the other half came from a variety of other categories.

Taken together, these “top of the top” ideas describe an interesting ideal scenario. Students in architecture, engineering, and construction programs would leave their university programs knowledgeable about deep green practice. Professionals would play a more active and visible role in shaping the public discourse on sustainability, resilience, and regenerative design. Innovative and entrepreneurial A/E/C firms would guide clients in maximizing financial returns through timing the renovation of new buildings, and they would lower carbon levels in the built environment through smarter design and construction.

*This refers to a state of Washington bill known as Initiative Measure No. 1631, or the Protect Washington Act, which was filed on March 13, 2018. The act proposes to create a fund for clean air and clean energy investments through financial penalties on high polluters. It is seen by supporters as a model that other states should adopt.

“According to the U.S. Energy Information Administration (EIA), the Building Sector consumes nearly half (47.6%) of all energy produced in the United States. Seventy-five percent (74.9%) of all the electricity produced in the U.S. is used just to operate buildings. Globally, these percentages are even greater.”
architecture2030.org/buildings_problem_why/

Mission Impossible: Highest Impact and Lowest Achievability

What about those initiatives that participants felt were of highest impact but hardest to achieve? It would be easy to discount such ideas based on the opinions of the experts who put them forward. But questions remain: what would it take to move a great, high impact idea from low to high achievability?

The strong majority of ideas that scored highest on impact and lowest on achievability belonged to the theme, “implement, encourage, or enforce standards and metrics.” The ideas involved greater rigor and accountability, and scenarios in which the firm would set and enforce standards that would be non-negotiable. One notable example was for all firms to design and deliver all projects to the standard of the Living Building Challenge, which nearly 42 percent of survey respondents felt was the most effective standard for sustainable, resilient, and regenerative design. A related example spoke to scale, and how firms could act in concert to solve ecological problems.

Action Forum participants also spoke of creating a “positive incentive contract structure” that one assumes would allow all parties in design and delivery to work more collaboratively and effectively toward sustainable, resilient, and regenerative design goals. Such contractual arrangements would certainly contribute to scaling solutions industrywide.

For more than a decade, delivery models such as IPD (Integrated Project Delivery) have aspired to achieve these ends but they are still far from the industry standard. Howard Ashcraft, a global IPD expert and partner at law firm Hanson Bridgett, challenged the A/E/C industry in a 2017 article for DesignIntelligence: “For more than 40 years, we’ve known what’s wrong with the built environment industry; it is fragmented, adversarial and inefficient. It uses the wrong business models and does not use technologies well. Surprisingly, we have had the prescriptions to fix these issues for a long time, too. So why haven’t we done it?”

Comparison of Key Ideas

Surveys vs. “Impact and Achievability” Exercise

Broadly speaking, the surveys conducted at the Action Forums (and online) focused on identifying barriers to deep green practice and the Action Forum quadrants exercise explored the creation and evaluation of potential solutions. Because attendees of the Action Forums participated in both the survey and exercise, one might expect a direct relationship between themes in the two activities than occurred.

While the survey showed a strong leaning toward economic barriers, the Action Forum exercise yielded relatively few examples of economic or financial ideas. When participants did argue in favor of the business or economic case, they seemed to coalesce around the themes of promoting lifecycle cost, using data for a reality check on cost or ROI, and promoting an understanding of the true costs of doing it “wrong” (by pricing externalities and establishing the dollar cost of carbon, for instance).

Economic ideas that were within the most commonly occurring Action Forum exercise themes included the following:

- “Tie energy upgrade policies to commercial real estate capital improvement cycles”
- “Establish training/resource budget”
- “Prioritize project budget to high performance building envelope.”
- “Discover & articulate value themes & messages”

The only explicitly economic theme from the Action Forum exercise, “focus on business metrics and economic impacts,” was responsible for only 3.4 percent of total responses and was not within the top 10 most frequently occurring themes. Examples for actions firms can take included:

- “Clarity on how values relate to business metrics.”
- “Develop method to ‘price’ externalities.”
- “Employ Life Cycle Costing instead of up-front costing”
- “Look at actual performance & cost outcomes”
- “Understanding, at a very base number, what the sale-able benefit is for the client who is ultimately going to be re-selling the design work and then, communicating that firm-wide.”

- “Showcase the business case for net zero + regenerative design (internally)”
- “Standardize economic models (for sustainability, resilience, and regenerative design)”
- “Establish dollar value of carbon”

Conclusion

Taken together, the survey and Action Forum workshop paint the picture of an industry in transition that needs even greater change.

A/E/C professionals who care about deep green practice and wish to have a positive environmental impact through their work are called to make fundamental change. The experts who participated in our studies challenged A/E/C professionals to begin with major shifts in mindset, including how they see their role within their firms, on projects, in relationship to clients, and relative to the public. Architects, engineers, constructors, and designers must not only elevate their standards of practice and expertise but also become advocates and educators in the close context of their firms and delivery partners, as well as the broader world outside the industry.

In short, A/E/C professionals are called to a greater and more comprehensive level of leadership.

Such changes don’t come easily or quickly. Unfortunately, environmental issues are pressing, and as the largest user of energy and greatest producer of CO2 emissions, the building industry does not have the luxury of continued slow evolution.

The surveys and Action Forums began to provide a vision for a future of greater positive impact in which professional practitioners exercised greater influence through education, advocacy, and media-savvy storytelling, and the different players in the industry began working in greater concert to create change at the scale needed. There is still much to be defined in how this vision will come about, but because of its current impact the A/E/C industry has the greatest potential to make positive change.

Notable Quotes
Philip C. Johnson
1906–2005

“Architecture is the art of how to
waste space.”

“All architecture is shelter, all great
architecture is the design of space that
contains, cuddles, exalts, or stimulates
the persons in that space.”

“I hate vacations. If you can build
buildings, why sit on the beach?”

“All architects want to live beyond
their deaths.”



2018 Leadership Summit Events

Each year the Design Futures Council gathers together around a series of essential themes ruddering the A/E/C industry. The gatherings are always titled as Leadership Summits or Forums. Each gathering is attended by leaders from property development, architecture, design, engineering, construction, finance, banking, building product manufacturing, academia, and more. The overarching goals for these exchanges are:

- relational connectedness among attendees,
- challenging the status quo of design and delivery,
- presentation of thought-leading content that alters perspectives,
- staging the questions every industry leader should be asking,
- and more.

The schedule of remaining DFC events for 2018 is:

Leadership Summit of the Future of Architecture...Preparation, Practice, Posture

October 9–11 (Venice - ITALY) - Centering around the La Biennale di Venezia, this event will bring together A/E/C leaders from across the globe to grapple with the accelerated changes encountered daily in the profession and highlights both opportunities and challenges.

Leadership Summit on the Business of Design

November 12–13 (New York, NY - USA) - All things business. This gathering deals with leadership, risk, organizational constructs, finance, marketing, and an ever-relevant list of themes every leader needs to know.

Leadership Summit on Technology & Applied Innovation

January 16–17, 2019 (La Jolla, CA - USA) - In this environment of rapid change in technology, architects, engineers and constructors must deal with fundamental shifts in what they will be asked to do, how they will work and the value they will produce. This event brings together A/E/C leaders to explore new developments and innovation in technology and how it impacts the professions.

Leadership Summit on Collaboration Across the Design Continuum

Spring 2019 (Atlanta, GA - USA) - The Design Futures Council brings together leaders in architecture, design, engineering and construction, as well as owners, developers, investors, legal professionals and underwriters in order to uncover the true barriers to—and great benefits of—genuine collaboration.

Leadership Summit on Sustainable Design

Fall 2019 (Location TBD) - As the Design Futures Council stands at the intersection of the A/E/C industry and sustainability, we bring together great minds to explore and exchange ideas in hopes of breakthroughs that will literally change the world. The Leadership Summit on Sustainable Design is a call to action for A/E/C to take the lead to measurable environmental sustainability.

All gatherings are limited to 100 executive-level participants to ensure the relational connectedness and personal dynamic the DFC has been known to sustain for over twenty years.



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AS OF SEPTEMBER 2018







Action Forum Seattle



Education & Talent New York



Education & Talent New York



Education & Talent New York

Action Forums: From Sustainable, to Resilient, to Regenerative Design DFC Leadership Summit on Education & Talent Events in 3Q 2018



Education & Talent New York



Action Forum Seattle



Education & Talent New York



Education & Talent New York



Action Forum Seattle



Education & Talent New York

A young girl with dark hair in pigtails, wearing a blue dress with white polka dots, is hugging a person from behind. The person is wearing a white shirt with a floral pattern and blue jeans. The background is a blurred outdoor setting.

AEC CARES

projectHouston 10.5.18

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clients keep picking
firms that are far less
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Lessons Learned from Resilient by Design: How Designers Can Engage Communities to Think Forward	SANDY MENDLER
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