AIA Best Practices:
Incorporating sustainability into practice

Value proposition for firms

By Andrea Love

Summary

Today's urgent climate imperative requires architects to build a base level of sustainability competency and energy literacy across their practices, and evolve integrated sustainability information into the design and building delivery processes. Incorporating sustainability into your practice can yield good design that is born of both aesthetics and performance, and assist in winning design awards, represent a marketing advantage with clients.

Overview

Today's urgent climate imperative requires architects to be prepared to address it. Firms need to evolve integrated sustainability information into the design and building delivery processes. Organizations need to build a base level of sustainability competency and energy literacy across their practices to prepare staff to address the challenges we currently face.

Sustainable design is a built environment that protects the planet and enhances human health while creating equitable and resilient communities. In 2013, in the Sustainability Leadership Scan, the AIA identified four priority areas for the institute to focus on: energy, materials, design & health, and resilience (Lazarus, 2013). Health and resilience were identified as emerging issues where architects provide critical design leadership, whereas energy and materials were identified as core issues central to an architect's role in the built environment. Because of the more direct impact and maturation of industry knowledge, this article focuses primarily on the environmental impact of architecture, with an emphasis on energy and carbon because of the urgency of climate change. The other pillars of sustainability are also important and will be the focus of future articles.

Signing on to the AIA 2030 Commitment to track the performance of the entire firm's portfolio and developing a Sustainability Action Plan for your organization are good first steps. Tools such as setting communal performance goals and integrating building performance modeling can set a vision for a project and enable teams to use sustainability information as a design driver.

Equal part to the technical side is understanding your organization and how to affect change. Utilizing tools like storytelling and making building performance part of how you always talk about your work can start to embed its importance within a firm. Staff education on topics of building performance equips them to

understand and engage with the performance data. Understanding the motivations and drivers of staff and clients alike, and reframing sustainability by using what they value, can bring others along in the cause.

Incorporating sustainability into your practice can yield good design that is born of both aesthetics and performance, and assist in winning design awards, represent a marketing advantage with clients. Architects are trained to take complex, often conflicting problems and develop beautiful, elegant solutions. The issues surrounding sustainability are some of the most complex but also some of the most important to society. It is challenges like these that inspired so many of us to choose architecture as profession, and it is how we can continue to demonstrate our importance and relevancy to the world.

Why now?

The planet has already started to see the effect of climate change with increasingly severe storms and flooding, continually warming temperatures, and detrimental impacts on our ecosystem. According to the United Nations' Intergovernmental Panel on Climate Change (IPCC), human activities are estimated to have already caused an approximately 1°C increase in global warming above pre-industrial levels. To avert significant impacts to climate change, the report urges keeping global temperature rise to below 1.5°C. (IPCC, 2018) To realize this goal, the report recommends cutting global carbon emission in half by 2030 and to zero by 2050.

Climate change and the built environment

Currently buildings generate nearly 40% of U.S. greenhouse gas emissions, with building operations representing about 70% of those emissions. The rest comes from the embodied carbon in building materials and construction (International Energy Agency and the United Nations Environment Program, 2018) and consume 40% of raw materials. (U.S. Green Building Council, 2019) Because of the significant impact the built environment has on carbon emissions, it needs to be a critical part of the solution to realizing the 2030 and 2050 goals to avert bigger impacts from climate change. As architects and stewards of the built environment, we can directly impact its carbon intensity, helping to realize these urgent goals. However, to do so will require radical change in the way architects design and deliver buildings.

The buildings being designed today will be operational well past 2050, when the IPCC recommends we should have eliminated all carbon emissions. Therefore, these buildings need to be designed to anticipate a carbon-free future and eliminate of fossil fuels. However, in order to stay below the 1.5°C target, there is a time value to carbon where dramatic cuts in carbon emissions are needed in order to reach the 2030 and 2050 IPCC targets. According to Architecture 2030, for new buildings that will be constructed between now and 2050, the carbon emissions associated with the manufacturing, transportation, and construction of the materials, their embodied carbon will constitute nearly half of the emissions over that time period, and embodied carbon will represent 74% of the emissions between now and 2030. (Architecture 2030, 2020) Focusing on the renovation of existing buildings, and the reduction of the embodied carbon of building materials, is critical to hitting the IPCC greenhouse gas reduction targets.

Because of the urgency and the role architects play in decarbonization of the built environment, the AIA announced in September 2019 the "Big Move Towards Environmental Stewardship," (The American Institute of Architects, 2019) declaring an urgent climate imperative for carbon reduction. The AIA has committed to transforming the day-to-day practice of architects in order to achieve a zero-carbon, equitable, resilient, and

healthy built environment. Specifically, the AIA adopted the tenets of the Committee on the Environment (COTE) Top Ten awards as the framework for design excellence and committed to encouraging greater participation in the AIA 2030 Commitment. This action explicitly defines sustainable performance as part of the definition of "good design." As members of the AIA, we will need to look at how, as individuals and as organizations, we apply this definition of design excellence in our practice and at the institute.

Embedding the business case for sustainable design

Embedding sustainability into practice is also part of good business strategy. There is an increasing demand from clients in both the public and private sectors for high-performance buildings. Large corporations are increasingly aware of their corporate sustainability image, and many disclose annually their impacts in corporate sustainability reports. Close to 500 colleges and universities from across the country have signed the American College & University Presidents' Climate Commitment pledging their organization to developing climate action plans, tracking emissions, and working towards dramatic carbon reductions for their campuses. As there is an increasing awareness and demand from clients for architects to understand the environmental impact of their organizations, architects need to be comfortable speaking to those impacts for the projects we deliver for them.

Additionally, businesses that embrace sustainability have been shown to better attract and retain talent, particularly for mid-career professionals. (Davis-Peccoud, 2013) According to a 2011 study by the Society for Human Resource Management, organizations with sustainability programs improved employee morale by 55% and increased employee loyalty by 38%. (Society for Human Resource Management, 2011)

Raising the bar

While the discussion about the importance of sustainability in the built environment has largely been within the building community the last few decades, there is a growing awareness by public and policymakers about the role buildings play in climate change, public health, and resiliency. Policies like Congress' proposed Green New Deal place an emphasis on addressing the environmental impacts of the built environment as part of their proposals. This growing attention to environmental and health impacts will continue in the future as public knowledge about the built environment's role in climate change, public health, and resiliency continues to grow.

Aggressive carbon reduction goals are being set in many communities, from New York City to California and many communities in between, to dramatically reduce their carbon emissions. For many of these communities, such as Boston, 70% of the carbon emissions come from the built environment. (City of Boston, 2019) As a result, there has been an increased focus on developing more aggressive energy codes and the environmental impact of the built environment. Even outside of communities that may have set aggressive energy or carbon reduction targets, building energy codes and certification programs such as LEED keep pushing the sustainability requirements higher and creating an increase in demand from the industry to be equipped to deliver more sustainable buildings.

Architects and the built environment are essential to addressing the climate crisis we are facing. We are well-skilled and positioned to deal with the complex problems that need to be addressed in decarbonizing the built environment and making healthier, more resilient communities. Addressing these issues is how we can demonstrate the relevancy and importance of architects to society.

AIA leadership in addressing climate change

The AIA has had a long history of involvement in issues around the environmental and health impact of the built environment and has continued to ramp up its focus on sustainable design in recent years. Over the last 30 years, at the nexus of many of those discussions has been the Committee on the Environment (COTE). COTE was started in 1990 by Bob Berkebile, FAIA, and others with the mission of addressing a broad array of environmental concerns. Early efforts included advocacy within the profession with starting initiatives like the COTE Top Ten Awards, as well as externally with the Greening of the White House, and development of resources to support practices to embrace sustainability as part of their design process with publications such as the "The Environmental Resource Guide." The guide was developed compiling the reliable, scientifically sound knowledge and insight on how architecture impacts environmental and human health.

The development of resource guides for practitioners has continued through to today with the 2012 "An Architect's Guide to Integrating Energy Modeling in the Design Process," the 2018 "Prescription for Healthier Building Materials: A Design and Implementation Protocol," and the 2019 "An Architect's Guide to Building Performance: Integrating Building Performance Simulation in the Design Process." These guides are tremendous resources to any practitioner interested in understanding better how to integrate these tools into their practice. In addition to resource guides, there are online education series that practitioners can purchase, including "Materials Matter," "Resilience and Adaptation," "Building Envelope," and the "AIA+2030" to further develop their knowledge.

The biggest program for the AIA to tackle is the issue of integrating sustainability into practice is the AIA 2030 Commitment. Started in response to Ed Mazria, FAIA, and Architecture 2030's Challenge, which set decreasing targets to reduce carbon emissions from operational energy usage working towards net-zero emissions in 2030, the AIA 2030 Commitment set about creating a framework for firms to sign on to the Challenge and "transform the practice of architecture in a way that is holistic, firm-wide, project based, and data driven." (The American Institute of Architects, 2019) The 2030 Commitment is well known for creating a reporting process for firms to demonstrate energy reductions. Equally important—though much less well known—is the requirement for signatories to develop a Sustainability Action Plan

Framework for incorporating sustainability

The key to incorporating sustainability into a practice is starting with building a knowledge base around building performance. My organization, Payette, which specializes in energy-intensive building typologies, first focused our efforts on reducing operational energy usage and building our organizational "energy literacy." This literacy is about shifting mindsets from a sustainable building defined by the discrete icons of sustainability it has—such as photovoltaic panels and external sun shades—to a more systematic mindset of a sustainable building with the lowest energy use intensity.

Sustainable design from the top down, the bottom up, and the middle

An organization may have a sustainability director or individual within the organization responsible for championing and shepherding the firm's efforts around sustainability, but literacy on the topic needs to exist throughout the organization at all levels. From the marketing coordinator to the firm president to the spec writer and junior staff drawing a façade detail, everyone needs to have some basic understanding around

building performance and how the decisions and actions in their realm of influence impact the building's overall performance. Building design is a team effort, and if the whole team has literacy around building performance, higher-performance buildings can be realized.

To have a sustainability director or not have a sustainability director: That is the question

While many firms may be contemplating the question of hiring or identifying a Sustainability Director for their firm, having a dedicated person(s) or distributed model of sustainability knowledge is dependent on your firm size and culture. There is no one right answer, as firms consistently delivering high-performance buildings exist in many shapes and sizes. However, here are some factors to consider when deciding if your firm should appoint a Sustainability Director:

Firm size—Smaller firms tend to not have the resources for supporting a dedicated sustainability specialist for their firm, medium firms may have an identified individual acting in a full- or part-time capacity, but it is common for large firms to have a sustainability director and often a supporting team.

Existing sustainability knowledge depth—Firms that have a depth of sustainability expertise, either in one individual or spread across multiple people, have less of a need for a technical expert. Firms without a lot of sustainability knowledge may benefit more from bringing in someone with a depth of knowledge in sustainability in order to help built capacity

Firm information management—Considering how information is managed in your organization can assist in understanding what sustainability structure is needed.

- Connected organization where information is shared with everyone. This is typically effective for smaller organizations, but a Sustainability Director may be less critical in this model.
- Centralized source of information that people can go to or a group that can work across the organization to be the connected to all projects as a sustainability resource. A sustainability director can be a good fit for this model. This structure can work for medium and large firms, but can be more challenging in complex organizations where a centralized knowledge source can be a bottleneck or lack capacity to span across very large organizations.
- Complex organizational structures where the in-house expertise may exist in many locations, building performance information needs to be curated and distributed by a Sustainability Director or identified individuals. In the networked organization, a Sustainability Director can play a helpful role in identifying knowledge gaps and advancing design practices to better incorporate sustainable thinking.

Part of the consideration around having a Sustainability Director is the desire for in-house expertise versus reliance on outside consultants. With in-house expertise of a Sustainability Director their input often makes it easier to integrate more real time into the design process, while retaining that fee and providing a market differentiator. However, a good cadre of sustainability consultants that can integrate well into a firm's design process can bring a wider range of project experience and depth of knowledge while mitigating the financial risk of in-house expertise. Firms that have found sustainability consultants who can integrate into their design process so that they can make design decisions informed by building performance may not need a Sustainability Director.

Depending on the size of your organizations and aspirations for a Sustainability Director, a sustainability team might be needed to support your firm. A recent survey of approximately 85 large (more than 50 employees) firms with Sustainability Directors revealed some interesting trends related to sustainability group sizes. Firms with less than roughly 250 people had one to four sustainability-focused FTE per 100 employees, whereas firms above 250 employees had 1/2 to one FTE per 100 employees. (BuildingGreen, Inc., 2017-2019)

Regardless of whether a formal position of Sustainability Director is the right fit for your organization, every firm will benefit from having an individual or group of individuals who will be the internal champions for sustainability and shepherd the process of the firm's transformation to better integrate building performance.

Building knowledge at the firm level

Sustainability has so many facets, including operational energy performance, human comfort, healthy materials, resiliency, embodied carbon, etc., that it can be overwhelming. Starting small by focusing on developing a knowledge base in an area most critical to your practice or, depending on the size and makeup of your organization, allowing different individuals to help lead literacy around different areas can be one approach to help break down the task.

In addition to building the knowledge base for existing staff, the development of an on-boarding process around sustainability can help to familiarize new staff with firm policies or commitments that have been made, such as the firm's participation in the 2030 Commitment or signing of the Materials Pledge. A central location of key documents and resources, such as policies or Sustainability Action Plans, and a brief orientation on sustainability can help new staff understand firm priorities. A page of your firm's intranet or folder on a server containing sustainability documents and resources can also serve as a useful knowledge management tool for all staff.

An excellent resource as a starting point for establishing this base literacy is the AIA's Framework for Design Excellence Toolkit, which provides an interactive resource on 10 topics of sustainability—from designing for equitable communities to design for wellness. The Toolkit includes best practices, high-impact strategies, resources, and case studies around each of the subject areas. One of the best starting points for sustainable design is the "If you only do one (or a few) things" section that highlights the most important thing a project can focus on to improve their building performance.

Practice-based research

One thing an organization will quickly recognize as it develops its knowledge base is all the gaps in information that exist. Developing a firm-based research program to tackle and better understand these gaps in industry knowledge is a great way to help advance your organization as well as practice. From the business case standpoint, doing research around an issue can allow your organization to be a thought leader on that topic. The AIA has case studies on its website of different organizations and how they have structured their practice-based research programs, as well as some grants like the Upjohn grant that are given out to support practitioners in their research. The Building Research Information Knowledgebase (BRIK) database and Knowledge Communities are great resources to explore and learn further about research that is being done at other organizations.

Because you can't manage what you don't measure, the AIA 2030 Commitment developed an annual anonymous reporting structure to enable firms to track their progress towards meeting the reduction targets

set out by the 2030 Challenge. Unlike other programs that seek to measure sustainability—such as LEED, which assesses the performance of exemplar projects—the 2030 Commitment is about measuring and tracking a firm's whole portfolio and everything that it designs.

Organizational support

While often receiving less attention than the annual reporting, the other key component of the AIA 2030 Commitment is the requirement for the development of a Sustainability Action Plan by every signatory organization. These action plans provide the opportunity to develop a strategic and comprehensive approach for transforming a firm's practice and portfolio towards reaching their sustainability aspirations. Any organization looking to better understand and improve the sustainability of their work should sign on and utilize the framework of the AIA 2030 Commitment.

Building on the success of the AIA 2030 Commitment, other knowledge communities and organizations have explored other ways to have programs that can help address organizational-wide impacts around an issue, such as expanding the 2030 Commitment to address embodied carbon or the 2019 "Materials Pledge" letter organized by the AIA Materials Working Group and the Portland Materials Transparency Collaborative. (Portland Materials Transparency Collaborative, 2019) Other allied fields have developed companion programs to the 2030 Commitment around reducing climate change, such as the Structural Engineers 205 Challenge from the Structural Engineering Institute (SEI) and American Society of Civil Engineers (ASCE) focusing on reducing embodied carbon in structural materials, or the Urban Land Institute (ULI) Greenprint focus on reducing greenhouse gas emissions. Programs such as these seek to outline actionable steps organization can take to work towards improving how they work.

Integrated design

The key to incorporating sustainable thinking in the design process is to integrate it throughout the design beginning at the onset. Before pen is put to paper to initiate the first design concepts, do so with an understanding of building performance throughout its lifecycle. If the first rendering shown to a client and design team with aspirations for a high-performance design is of an all-glass building, and that is the image the client latches on to, then the design team will spend a lot of effort either trying to bring the client along to a different, less glassy design aesthetic that will perform better or spend their time working on finding strategies to overcome a design aesthetic working against their performance goals.

Every firm has a different culture, and organizations need to find the right strategies for their firm to embed sustainability within their culture. However, there are a few simple strategies that can have universal applicability.

- Develop a firm culture around building performance.
- Establish and share tangible building performance targets.
- Leverage integrated teams and data.
- Identify internal sustainability champion(s).
- Embrace performance modeling.

We monitor what we measure

Developing a firm culture around building performance means making performance part of how we talk about our work. Just as every designer knows the location and square footage of their project, they should also know the anticipated energy use intensity (EUI) or predicted energy usage from an energy model per square footage of building area. Like miles per gallon of a car, this normalized metric allows an understanding of performance that can be compared and benchmarked with other buildings. Maybe this becomes part of existing project check-ins or reviews to help build this expectation, but making performance part of everyone's base understanding of a project and how it is talked about is key to building widespread sustainability knowledge.

In my practice, we found that small acts such as including project EUI in the pin-up space for each project, and including it on our website and in anything shared about projects, went a long way to building this energy literacy firmwide. Posting the performance information also had the added benefit of starting an interesting internal dialogue as to why one project was performing better than another when teams thought they would be comparable; and creating some friendly competition between projects as each team often wants to get lower than the neighboring team or their last project. Simply making performance part of our dialogue on how we talk about our work gives value to performance and starts to influence behavior.

One of the simplest and most effective tools is setting a performance target, such as a goal EUI, early in design. In my firm, we have found that for every project we have set a goal EUI, regardless how aggressive, we have met it. This is because the act of setting a target EUI makes it an active effort the design team is working towards, rather the result of already made decisions at the end of design. It also establishes a common goal that the entire team can weigh in on and have a clear understanding of what everyone is working towards. Human nature is inherently competitive, and if you ask an owner or a design team if they would like to be average or a high performer, they will often push to have a lower EUI than might be anticipated.

Energy benchmarking

Setting an aggressive but reasonable target requires benchmarking and an understanding of what a typical and high-performing building of that location, typology, etc. might be. While targets can be set for many building performance characteristics—such a water use intensity or embodied carbon per building area—EUI has the most robust datasets out there to benchmark against. The AIA 2030 Commitment's Design Data Exchange (DDx) compiles and links to several datasets to benchmark against and can be a very helpful tool for benchmarking. Some commonly used benchmarking tools:

- Commercial Building Energy Consumption Survey (CBECS), 2003—the baseline for the 2030 reporting
- Architecture 2030's Zero Tool (uses CBECS 2003 data)
- EPA's Target Finder (uses CBECS 2012 data)
- Labs21—benchmarking tool specifically for laboratory buildings

Benchmarks can also be developed from past projects or existing building on which a firm might have performance information. Because large, robust datasets do not exist for other performance metrics, such as embodied carbon or water use intensity, benchmarking from projects with known performance information is a good way to set a target. If information for a comparable project can't be found, setting reduction targets against standard practice or what would have been designed without pushing performance can be another effective way to set a common performance target. For example, when wanting to reduce the embodied carbon for of a project, and while an industry standard baseline might not currently exist, you can start by setting a reduction target for the façade system compared to traditional practice or the basis of design. A comparison between a timber curtain wall and a traditional aluminum curtain wall was found to have over 50% less embodied carbon.

Building performance modeling

Once a team has agreed upon and set a performance target, integrating performance information into the design decision process is key in order to understand how design decisions will impact the established project goals. One of the best ways to understand performance impacts is with integrated building performance simulation tools. Integrating this modeling throughout the design process is key to making informed design decisions and delivering high-performance buildings.

Invariably, when discussing building performance modeling, the discussion quickly turns to tools. The fortunate thing is that are myriad tools currently available in the market; however it is an ever-evolving landscape and they all have their pros and cons for usage. Ultimately, each firm should select the tools or suite of tools that best fits its workflow and capabilities. This many require some research and testing of tools to determine the right fit for your organization, but here are some guidelines.

How big is your toolbox?

For a long time in performance modeling, there was a notion of having one tool that can do everything—integrate into your architectural design software to perform daylight modeling, energy, computational fluid dynamics (CFD), etc. Some tools on the market attempt to do this but do so at the cost of complexity and ease of use for less technical staff, or oversimplifying and limiting customization. Other tools have taken the approach of discretizing things into components that can be reassembled in different ways—more like a toolbox, which gives more flexibility to better prod and understand issues but often comes at the expense of ease of use. When evaluating tools, consider if a single tool or toolbox approach works best for your organization. An organization designing in Rhino, facile with Grasshopper, and interested in the ability to have great control over the simulations might be better served using the toolbox approach of the Ladybug suite; whereas if those skills do not currently exist in the office, another tool might be considered.

Who is modeling?

Another factor to consider: Who will be doing the energy modeling? Firms with embedded engineering practices may choose to rely partially or wholly on them for providing performance simulation. Firms without internal engineers should consider how much modeling they would like in-house versus relying on consultants. When relying on a consultant for all or part of the integrated modeling, consider capabilities and turnaround times. Do they work iteratively? What is generally the turnaround time? In general, architects and engineers tend to have different working styles, so it is worth acknowledging where those strengths lie. While certainly there are exceptions to this generalization, architects tend to work in an iterative manner, where options are quickly reviewed and evaluated, some or all thrown out or modified, and then the next evolution of options are reviewed.

Engineers, on the other hand, tend to have a more linear design process in which, once a decision is made, they run through a more detailed analysis to better understand that option. This may mean that quick, early, and iterative modeling that has only a few days between the generation of design options and the need to make a decisions on them is best handled in-house by the architectural design team; whereas a detailed model showing energy savings for LEED documentation can be better performed by a consultant who might be better in the weeds of the model and can afford to have a longer turnaround. Both are important and often needed, but understanding who is best-suited to do them is important to understanding a firm's individual approach to performance simulation.

Another factor to consider within an organization is if a democratic or specialist approach fits best. Is there an individual or group of individuals that would work horizontally across all projects to embed this integrated modeling, or is there a larger general group of staff who will do performance modeling as part of their project responsibilities? The technical depth and skills of those doing the modeling within an organization is important to consider when thinking about the ease of usage of the tool and specialized knowledge required. Easy, simple tools may be appealing for more broad-based usage, but this should be weighed against the ability to adjust the tool to be representative of your projects and, therefore, the accuracy of the results generated. In other words, if a tool quickly generates a square office building to run analysis on, and that is what you are designing, then the simplified tool is a good fit; but if you are designing a hospital with a number of wings and you can't change the typology and shape, the simplified tool may not be a good match.

Early-stage modeling as a design driver

Historically, many performance tools have been used to perform whole building analysis of a project at the end or near the end of design to document that building. Integrating performance simulation tools early in the design process requires a different approach to modeling. Early in the design process, there are often many unknowns, and answers are often needed quickly in order to stay in sync with the design process. Because of this, "shoebox" modeling of a representative space—such as an office in an office building or patient room in a hospital, typical bay, or prototypical floor of a building—is a very helpful approach. The goal of a shoebox model is not to understand the accuracy to the third decimal point, but to understand if looking at a series of options makes the performance go up or down? By a lot or a little? Utilizing the best understanding of the project at the time, or based on a typical space, we can quickly understand the sensitivities and inform design direction.

One of the exciting things about the computational power of our current time is the ability to run thousands of parametric options. While this may seem overwhelming, it can be a helpful tool, particularly early in design when the design space is so large. Running parametric simulations of myriad design considerations can then allow design teams to prod the data to understand instantaneously how different design scenarios impact performance. Or the large dataset can be used to understand the possible combinations of design parameters that can yield the highest performance. For example, looking at the combinations that yield the lowest EUI and peak loads, a good barometer for HVAC system cost, may show that only one of the options can meet those goals, whereas others might be shown to be less sensitive and many of the options might yield the desired targets.

With so many building performance simulation tools, each offering a multitude of different outputs and for different time scales, it is important to establish the question(s) being asked before embarking on any building performance simulation. It is also valuable to agree on the design space and what the goals are in order determine the options considered. For example, a team may be interested in doing a daylight analysis of different glazing options. However, if they are interested in decreasing their peak solar radiation on a summer design day to understand if a radiant floor can handle the load, this is different than if the team was

interested in understanding how to optimize comfortable daylight in a space. While both would use daylight simulation software, the former would be looking at the results of solar radiation on the floor for a single day, whereas the latter would be looking at the annual useful daylight illuminance at the height of a work surface. Building performance simulation can be useful to answer many questions about the quality of the space, impacts on the occupants, and environmental impacts.

In 2019, the AIA released *An Architect's Guide to Building Performance* which can provide additional guidance on incorporating building performance simulation into practice. Additionally, depending on the tools or suite of tools selected, there are several online tutorials and resources on different software that can be helpful for learning the tools.

Taking action

Regardless of the hierarchy in your firm, there are actions that you can take to transform your organization and the profession. Advocate within your practice to incorporate sustainability in order to better appeal to clients, respond to the urgent climate crisis, and ultimately produce better designs. As architects, we should also be external advocates. Our technical knowledge and understanding of the built environment is an important resource to share with policymakers and community organizations, to help support them in developing policies and programs to minimize the environmental and health impact from the built environment. Many local components are involved in advocacy around sustainability issues, and you can get involved to help support those efforts in your community.

Incorporating sustainability into practice takes an understanding of the unique culture and way of working for your organization. Understanding that is important homework for developing a Sustainable Action Plan that outlines the tools and strategies to transform your organization to embed building performance throughout.

It is important to consider all facets of your organization and how to embed sustainability in order to advance your firm. Are there existing structures in place that building performance can be added on to, rather than creating everything from the ground up? Which are the projects in which the design team and client are most interested in pushing performance? Sometimes starting where you are most likely to be successful and growing from there helps to show what can be possible and creates a more fun sandbox that other teams will then want to come play in. While sticks may sometimes be needed in lieu of carrots to change firm culture, it is always easier and more successful to make the behavior you wish for be a desirable thing.

Creating cultural change

Understanding people's motives and what they value as important is critical to changing behavior. It is very hard to change someone's value system, but it is easy to change behavior if it is something that they value. While the climate crisis and environmental impact of buildings may motivate some, it has many other positive impacts on firm operations that can often be more motivating for others. Here are a few examples:

- Designers who are concerned about the quality of design and winning design awards? Show them beautiful high-performing buildings (the COTE Top Ten awards are often a good place to start), and how the AIA is incorporating sustainability metrics as part of all design awards. Using building performance as a design driver can lead to beautiful buildings derived from their performance and help them win more design awards and get better recognition in industry press looking to highlight good design, which has been defined to include sustainable design.
- Leadership concerned about business development and winning new work? Show them the client's commitment to sustainability, if your market sectors are leading the way. Talk to them about how incorporating sustainability can be a business differentiator and help give your firm a competitive edge.
- Project managers worried about schedule and budget? Demonstrate how early analysis can lead to early informed decisions, which can often result in efficiencies later in design. Performance modeling can help with endless optioneering and provide guideline and direction on design decisions; and since everyone has a common understanding around the performance benefits, it can help with backtracking. Incorporating sustainability can help a project respond to ever-increasing energy codes and client demands. The added value of integrated performance modeling might help you negotiate higher fees or additional services for that work.

While disrupting the status quo in the design process to incorporate sustainable design is a key part of changing a firm's culture. It is also important to make sure people and functions outside of the design practice are brought along. Individuals responsible for marketing need to understand how to talk about the aspects of building performance for your work, and how to respond to RFPs and other requests on your firm's approach. Individuals responsible for setting up lunch-and-learns or running your materials library also need to be educated about policies pertaining to material health and environmental impacts. While the impact of running our firm may pale in comparison to the impact of the buildings we are designing, walking the walk, evaluating how sustainable your firm operations are, and identifying opportunities for further improvement are easy ways to start implementing something and bring sustainability issues to the forefront of your organization.

Changing firm culture and disrupting the status quo in the design process is hard. Developing a Sustainability Action Plan that outlines the priorities and changes you are interested in seeing for your organization is a great first step along that journey. Signatories to the AIA 2030 Commitment develop a Sustainability Action Plan as part of their commitment. These are all publicly available as a resource on the 2030 Commitment website, a great resource to use a starting place for a Sustainability Action Plan and to learn what approaches your peers and firms you aspire to emulate might be applicable to your organization. Places where you can start small and focus on modest behavioral changes that can be leveraged to grow and influence firm behavior are helpful to identify early as places to begin. Whereas every firm culture and how it may need to evolve is unique, there are a few frameworks that I find helpful.

Because there is so much data that exist in the world of building performance, it is easy to rely on numbers to try to persuade people. Numbers are important and can help, but storytelling is also a powerful tool for creating cultural change. Good stories have the power to inspire, motivate, and move people because they connect with us and help us remember and make meaningful the data. (Denning, 2019) According to

Annette Simmons, author of The Story Factor, "Stories are how our brain codes what's important. Nothing is meaningful or relevant, but for the stories we tell ourselves about it." (Simmons, 2019) It is a necessary part of internalization and moving beyond just being informed of an organizational decision for a change. Use stories, along with data, to help get to both the hearts and minds of employees.

Strategies for moving the needle

Another behavioral change model that I have found helpful was developed by a researcher at Stanford, BJ Fogg, who said there are three elements that must converge in order to change behavior: motivation, ability, and a trigger. He simplifies them to "Behavior = Motivation x Ability x Trigger" or "B=MAT." (Kosner, 2012) A simple example: I want someone to set an early energy usage intensity (EUI) target for their project. For that to happen they need to have some motivation to want to set that target, so perhaps I would tie having a target set to something they already value, such as pinning it up as part of project information and making it as part of design discussions. They need to have the ability to set a target, so they need to understand what a good or bad EUI might be and have tools at their disposal to benchmark against. Lastly, there needs to be a trigger or prompt, perhaps tying it to something like an internal project review at the end of each phase.

There is a relationship between someone's ability to do something and their motivation to do so. According to Fogg, people will do something, even if their ability to do so is difficult, when they are highly motivated. In our previous example, perhaps they only get their bonus after an EUI target has been established. Then probably the first thing that they would do for a project would be to set a target. If their ability to do something is easy, you can often still get the desired behavior, even if the motivation is low. If they know that when they have an EUI set, it will keep me from pestering them about it, and it only takes them a few minutes to do so, then they are likely to do it anyway, because they will spend more time having the conversation with me about it than it will take them to set the target. Behaviors that are difficult and have low motivation are hard to implement and likely to fail. There is a conceptual line of action that can be drawn between how motivated people might be in relation to their ability to do it that Fogg refers to as the "Action Line."

As a change-maker in an organization, this can be a helpful conceptual model to think about when trying to change behavior. Can you change people's motivation around a desired behavior, or can you relate it to something that currently motivates them? What is their ability to do it, and is there a way to support them in that ability or make it easier? What can help to trigger or prompt them to change their behavior from what they have been doing? Fogg has an interactive Behavior Grid that, depending on the type of behavior (i.e., a new behavior, stopping a behavior, or increasing a current behavior) and duration, those who are interested in reading more or thinking about a specific behavior can use as a resource. (Fogg, 2019)

When trying to incorporate sustainability into a practice, it is not uncommon to run into at least small pockets of resistance, with excuses around tight fees and fast-moving schedules. While schedules and fee impacts were addressed a little earlier, personally I have found the best approach is to leverage other successes as examples of how sustainability can be incorporated into the design process with minimal to no impact on budgets and deadlines.

Another common refrain is that their project is one in which the client doesn't want or isn't asking for a high-performance building. While certainly not every client is on the forefront of sustainability, it is worth first prodding a little to understand where the perception of the client's resistance might lie. Just because they

haven't asked for it doesn't necessarily mean they don't want it. I have found that if you deliver a building that uses less energy than it might otherwise within the project budget, very few clients object.

As with people within our firms, I find determining their motivators and drivers to be the most successful way to advocate for a high-performance building. For example, I do a lot of higher education work where many of the organizations have climate action plans and goals to work towards dramatic reductions or elimination of campus greenhouse gas emissions. Framing sustainability strategies around a story of carbon can be an effective way to discuss options. For example, in healthcare energy usage is often not a big decision driver, as operational energy costs are not a big line item overall in a hospital's budget. However, they do care about things like occupant comfort because they want to decrease staff turnover and improve patient satisfaction surveys, since those contribute to their rankings. I may talk about a technology like a chilled beam's energy and carbon impact to one client, and on its impact on occupant comfort to another. In the chilled beam example, for both typologies it can also often decrease construction costs because of smaller mechanical equipment and the ability to decrease floor-to-floor heights. Construction cost seems to be a near universal driver for all clients, and always a great way to advocate for something it can help.

The great thing about sustainability strategies is that they can have so many benefits on occupant health and experience, the quality of the space, peak loads and construction costs, energy usage and operational cost, or environmental impact. Framing discussion with clients around what is important to them is the best way to advocate for a high-performance approach.

Advocating for sustainable design in every project

Even if a client is still not advocating for a sustainable building, there is still a lot that we can do as architects that is within our control. Not every decision made when designing a building requires client permission, and whether it is how we detail the envelope or a material that is selected because it has a lower embodied carbon, there are things that we can influence regardless of the client.

How sustainable design is integrated in a practice will vary from firm to firm depending on their unique culture, location(s), typologies, etc. However, the way it is realized in smaller firms and larger firms is likely to look quite different. Larger firms with more resources often have one or more sustainable design leaders. They may be able support embedding specialized skills like dedicated energy modeler(s). On the flipside, changing cultures in large multi-office firms can present far greater challenges due to the complexity and magnitude inherent in those organizations.

Small firms have the reverse challenges and opportunities where changing the culture and mindsets is often easier with only a few people to influence. However, the resources and abilities to do so are far more limited. Small firms likely need to rely more on consultants for specialized skills and look for tools that fit within their workflow that appeal to the often more generalist skill set of employees. Medium-sized firms seem to lie in-between, experiencing many of the challenges and opportunities experienced by the small and larger firms.

A great way to understand firm sustainability structures is to look to peer organizations or firms that you admire and see how they might be organized or approach sustainable design. While every firm is unique, and their recipe for success is unlikely to produce success at another firm, a lot can be learned from others to aid in developing an approach that strikes that right balance for your organization.

Future vision

The architectural profession is at a critical junction: Will we rise to meet the challenges we face from the built environment's impacts on climate change, environmental degradation, resiliency, equity and human health impacts? Buildings have a significant impact on the world's carbon emissions, and the next few decades are our opportunity to be part of the solution.

Transforming our firms to be better equipped to delivering high-performance buildings is the first step toward success. Below is a checklist of action items to start with:

- Sign up for the 2030 Commitment, if your organization has not already signed on.
- Track your progress towards those goals to see where you fall short and where your success lies. Leverage those goals to continue to evolve as an organization and improve. Transforming firms is a slow process. Celebrate early successes and learn from the failures to continue the evolution.
- Create a Sustainability Action Plan to set your road map for transforming your organization.
- Identify leadership to champion building performance within your organization.
- Educate yourself and your organization about sustainability and build a knowledge base throughout the organization. Buildings design is a collaborative process and we all need baseline literacy.
- Set early performance targets. Make sure the whole team is aware of the goals and working towards them.
- Make design decisions that are informed by building performance. Incorporate performance modeling and sustainability into the design process from the onset of a project.

Ultimate success is when our firms and profession have been transformed to deliver carbon neutral or positive buildings with low embodied carbon that are regenerative to the environment, supportive of human health, and resilient to the world we live in. Until that vision is reached, we need to continue on our path to get there.

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About the contributor

Andrea is a Principal and the Director of Building Science at Payette, the 2019 AIA Firm Award recipient for their work fusing design and building performance, and has worked on five recent COTE Top Ten Award winning projects. At Payette, she integrates building performance into all of their work and leads their internal research efforts. She was the Principal Investigator on the 2012 AIA Upjohn Grant research grant focused on thermal bridging and lead the development of Payette's Glazing and Winter Comfort and Kaleidoscope tools. She has served on the AIA COTE Advisory Group, AIA 2030 Working Group, the boards of Boston Society of Architects and Built Environment Plus (formerly USGBC Massachusetts), and has been a Lecturer at MIT and Harvard on building performance. She has her BArch from Carnegie Mellon and a Masters in Building Technology from MIT where she was the recipient of the Tucker-Voss Award, and was a 2017 recipient of the AIA Young Architect Award and is a LEED Fellow.

Peer review of article by: Anne Schopf, FAIA; Heather Holdridge, AIA; Katherine Peele, FAIA; Melissa Wackerle; Matthew Welker, Assoc. AIA; Rachel Minnery, FAIA

Content facilitation provided by: Christopher Meek, FAIA; Heather Burpee; Mike Abrahamson of Center for Integrated Design/Integrated Design Lab at the University of Washington.

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This article corresponds to:

Architect's Handbook of Professional Practice, 15th edition Unit 1 - The Profession
Chapter 10 – Design Project Management
Section 05 – Design Phases