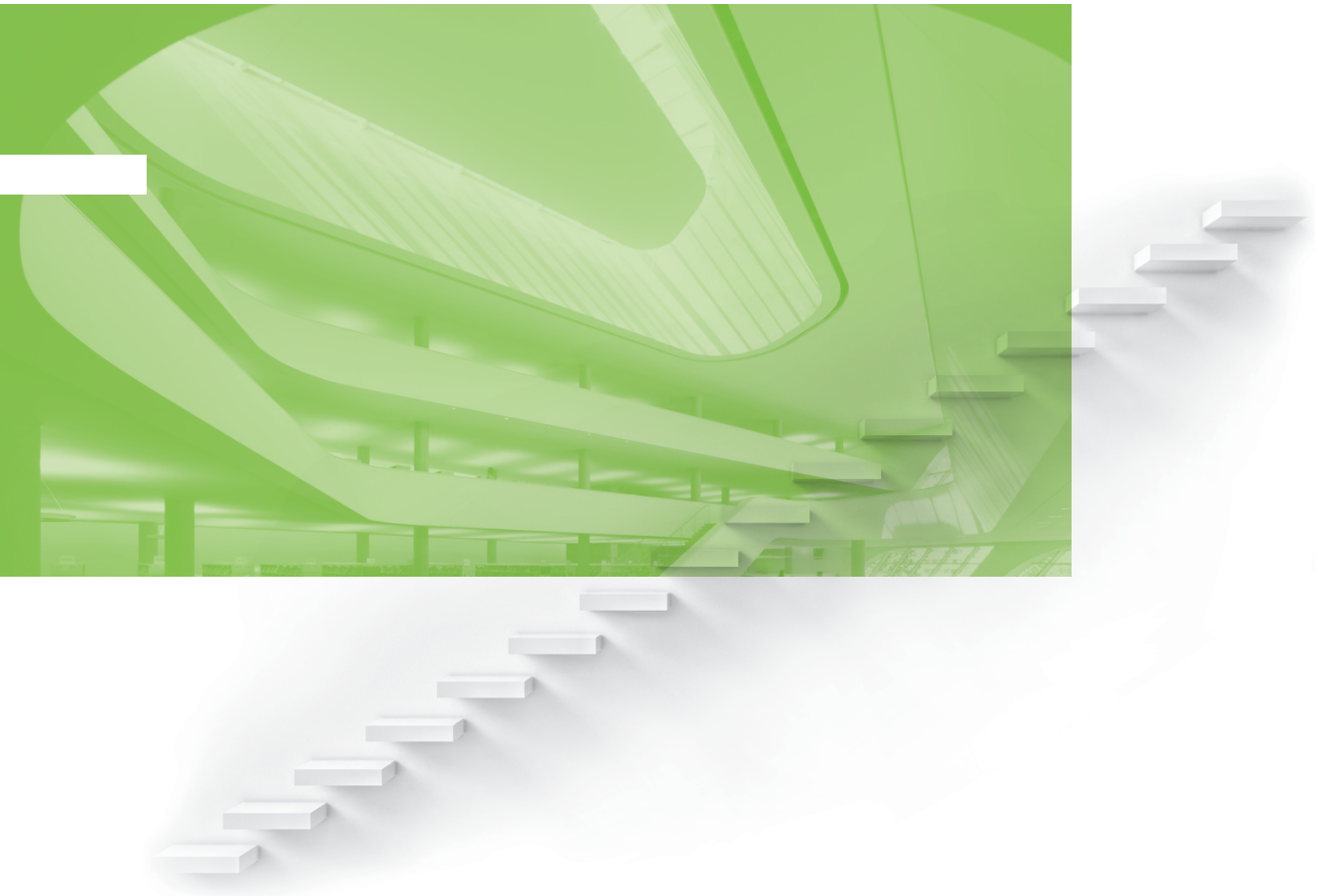
AIA 2030 Commitment

2014 PROGRESS REPORT



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We now know much more about how to get from aspiration to activation in greenhouse gas reductions.

Introduction

2014 was a year of more for the AIA 2030 Commitment. There are more firms committed to meeting the ambitious goals of the program than ever before. Since 2010, this number has more than doubled and represents the full spectrum of our profession—from solo practitioners to large multinational practices. In addition, more of these firms are reporting on their progress toward creating a carbon-neutral built environment; 2015 saw a 40 percent increase over just last year. And together these architects reported 78 percent more projects than in 2014, amounting to 50 percent more gross square feet of data collected from 51 countries across the globe.

But it's not just this continually growing set of numbers that matter. It's what these numbers tell us about what the profession is achieving. The AIA 2030 Commitment is the Institute's signature program to quantify and report the progress AIA members are making as vanguards in the effort to reduce greenhouse gas emissions in the built environment, and ultimately help turn the tide against climate change. The Commitment is no small undertaking. From a practice perspective, it challenges architects to rethink their approach to building performance, not just at the individual project level, but across their entire portfolio. As a practical matter, capturing and reporting the hundreds or thousands of individual energy performance decisions made across an entire year requires a major commitment of intellectual and human capital.

To ease the reporting load and empower architects to make the most of their energy efficiency improvements, 2015 was also a year of more improvements in our methodology, and more insights about what makes an effective project.

Earlier this year, we rolled out the AIA 2030 Design Data Exchange, or DDx. This tool is a lynchpin in our continued growth strategy for the program in two important ways. First, it provides massive efficiencies for reporting data, streamlining the process and enabling firms to enter their project information in real time, instead of having to wait for the end of the year. In addition, the DDx provides a full suite of sophisticated tracking and reporting tools. At virtually the click of a button, architects can view their building performance projections and measure them against their goals. Aggregate data from all users can also be compared over time and across building types and geography.

In addition, thanks in part to the enhanced DDx reporting capabilities, we now know much more about how to get from aspiration to activation in greenhouse gas reductions. A standout finding from 2015 is the critical role of energy modeling in improving building design. Modeling early in the process helps ensure that there is greater interplay in the decision making between efficiency and aesthetics from the initial stages of a project. This negates the need to either undo design decisions that have already been made in exchange for improved performance, or altogether forgo those options because the project is too far down the road.

Of course, despite a watershed year for the Commitment, more is not the same thing as enough. Over the next decade and a half, we'll still need more of everything. More committed firms, more projects, more modeling and more reductions in energy use. But if the progress we've made is any indication, with a little more effort, we can ultimately reach our goals.

Key Takeaways

Firm participation is growing, with **33 new signatory** firms in 2014 and a **40% increase in reporting.**

More firms are joining the AIA 2030 Commitment, and they are reporting more data as well. This year's report includes projects from 140 firms, up from 99 last year. From one-person shops to global pacesetters, architecture firms of all sizes are making energy reduction basic to their business.

Energy simulation is the key to meeting the 2030 Challenge goals, with **26% of modeled projects meeting the goal** and an additional 25% coming close.

Modeling early and as part of a structured process makes for more informative models, which in turn can lead to projects that more successfully balance aesthetic and programmatic choices with energy reduction goals. Only 44% of projects were modeled in early design phases, although energy simulation carries more force when it guides big design decisions that are hard to undo later in the process.

The 2030 Commitment program has **global impact,** with architects reporting projects from **51 countries** around the world.

The volume of work aligned with the 2030 Commitment keeps growing worldwide. Reported projects come from more than 51 countries, including four Arab nations, three countries in sub-Saharan Africa, Indonesia, India, and China. In these parts of the world, population is growing at the same time that carbon emissions need to fall. Architects' work in these markets will do much to ensure that communities can prosper without further climate damage.

Program impact is increasing, with **4,345** projects in whole building projects and another 3,837 interiors—only projects representing **2.4 billion gross square feet** reported.

The impact of the 2030 Signatory Firms is not insignificant, as the number of projects from reporting firms has nearly doubled since 2011. This program has a profound influence on energy consumption and has the potential to significantly reduce carbon emissions worldwide.

The **AIA is working to increase energy analysis in architectural practice** with new education and resources such as the **AIA+2030 Online Series** and the **AIA 2030 Design Data Exchange.**

The AIA 2030 Design Data Exchange (DDx) will clarify the many ways teams are bringing energy-reduction goals to their work. Firms that specialize in particular markets, project types, or styles can use the AIA 2030 DDx to report project data and gain a better understanding of how similar groups around the country are handling the same questions. AIA National has also teamed with Architecture 2030 and AIA Seattle to deliver the AIA+2030 Online Series to educate architects on the hows and whys of using energy models to inform design.

The AIA 2030 Commitment: Progress in 2014

In 2014, 140 committed firms reported project data; the biggest growth in this reporting came from midsize practices (Figure 1). These are not only the international powerhouses who market cutting-edge solutions, nor are they just the maverick solo shops whose theories influence critics more than clients, they are local, regional firms designing the schools and offices and homes that define daily life throughout the world. These firms reflect the breadth of specialties and regions and firm sizes in our membership. All new and reporting Signatory Firms are listed in the appendix.

The 2030 Commitment gives architects a chance to influence clients' views of the future. A participating firm asks owners, users, and future occupants to judge our buildings by how much energy they use. In that process, energy efficiency becomes an architectural yardstick as important as aesthetics or budget.

Even though the share of firms reporting and projects covered remains small as a function of architectural work worldwide, the gross square footage in this year's report makes an impact. We see 32 projects of more than a million square feet and 173 projects between 100,000 and 500,000 square feet predicting decreases of energy use intensity of 60 percent or greater (Table 1). Most notably, projects of all size meet the 2030 goals. This is the vanguard, but a more visible and better-documented vanguard can create greater momentum.

The AIA has learned to treat data in each year's report as points in a transformation. The amount of total square footage meeting the goal has increased, as has the number of net-zero projects. Across all projects — including those already aiming for carbon neutrality — reporting the 2030 portfolio anticipates a mean energy reduction of 36.9% from the national average. The modest overall reduction projections are a function of the lack of energy simulation when making design decisions. This is due to two issues: designing to code minimum and running compliance models after design decisions are made. In both scenarios, passive design strategies that make the biggest impact to curb energy use aren't evaluated and incorporated to their greatest potential. Projects that don't model are relegated to reduction equivalents based on code stringency and don't have a full view of energy use in building systems.

The Commitment aims to make daily life more carbon-efficient for thousands of real people who work in spaces beyond high-tech labs or buildings designed by "starchitects." People who work in offices that Commitment participants design will do their jobs with, on average, 47% less carbon intensity due to iterative simulation and thoughtful design. Students in primary, middle, and high schools will be able to study how their buildings function with 40% less on-site fossil fuel, on average (Figure 2).

Across the world, these projects rebut the assumption that everyday buildings can't cost-effectively reduce energy. This is true even in retail and residential settings, where although average predictions for energy savings look more modest than those for institutions or office buildings, they're still deep enough to make owners notice how energy savings flow from architectural choices. These choices make a big impression if they also produce lower bills or higher productivity. They can be more daring.

FIGURE 1. Number of Reporting Firms by Staff Size Over Time

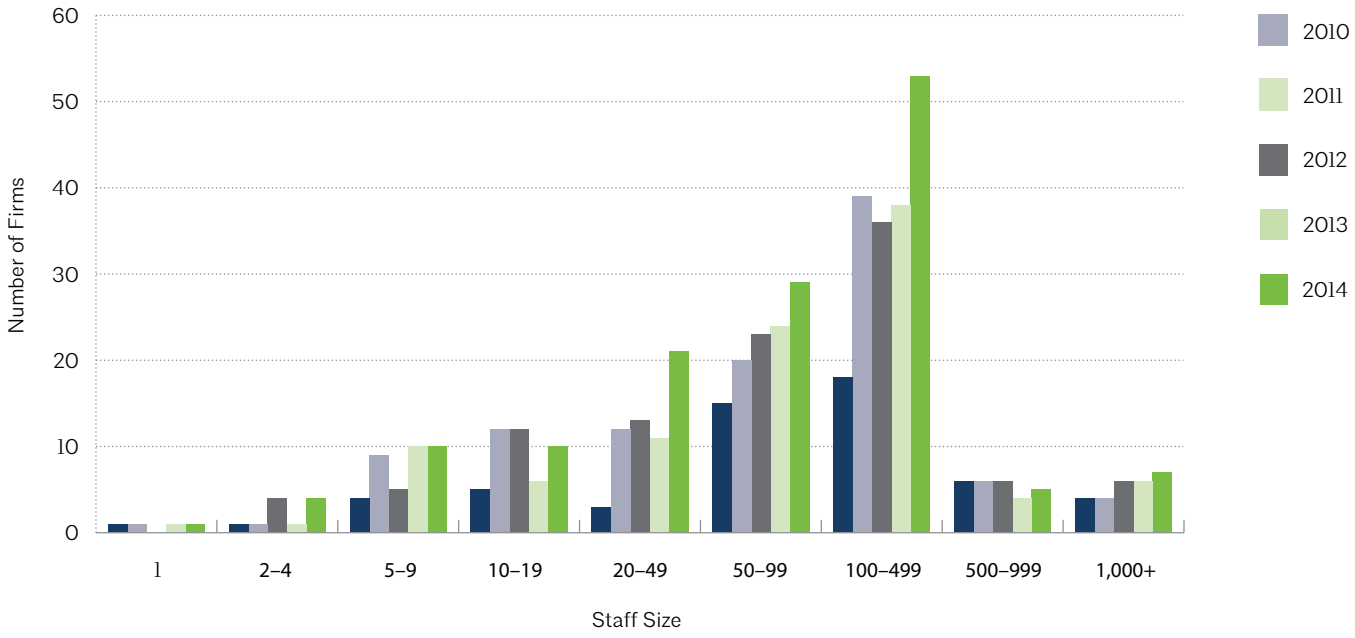


Table 1. Projects by Size

Project Size	2012 Ave. pEUI Reduction	2013 Ave. pEUI Reduction	2014 Ave. pEUI Reduction	GSF	No. of Projects	No. of Projects Meeting 60% Target
<25,000 GSF	36.7%	39.4%	36.0%	9,321,437	870	65
25,001–100,000 GSF	34.7%	38.0%	36.4%	62,654,955	1,044	121
100,001–500,000 GSF	35.7%	40.0%	38.2%	245,231,368	1,078	173
500,001–1,000,000 GSF	36.2%	41.7%	33.4%	128,412,084	185	22
>1,000,000 GSF	39.4%	32.1%	36.7%	615,197,610	226	32

Figure 2. Average pEUI Reduction by Project Use Type

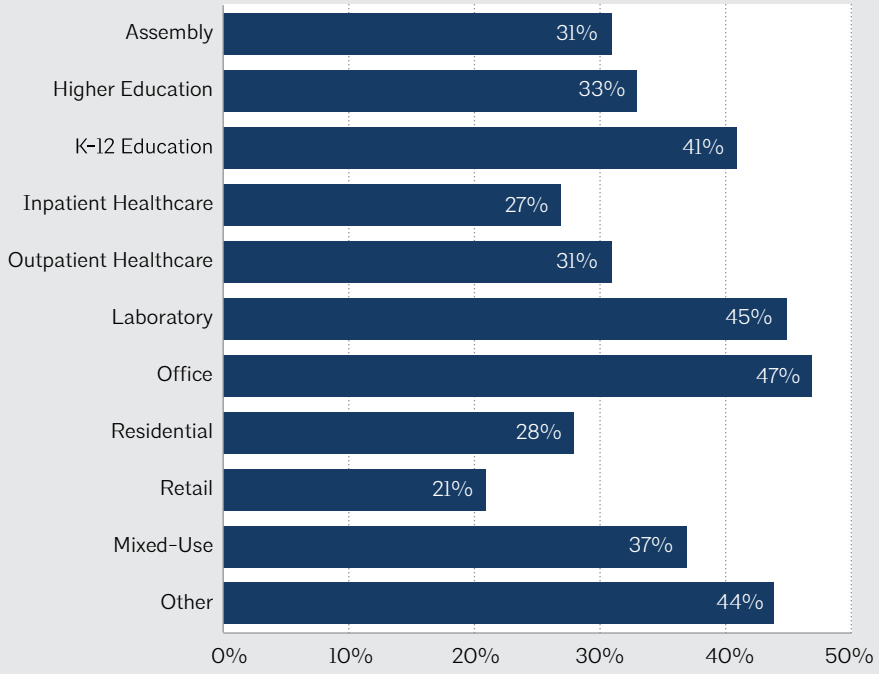
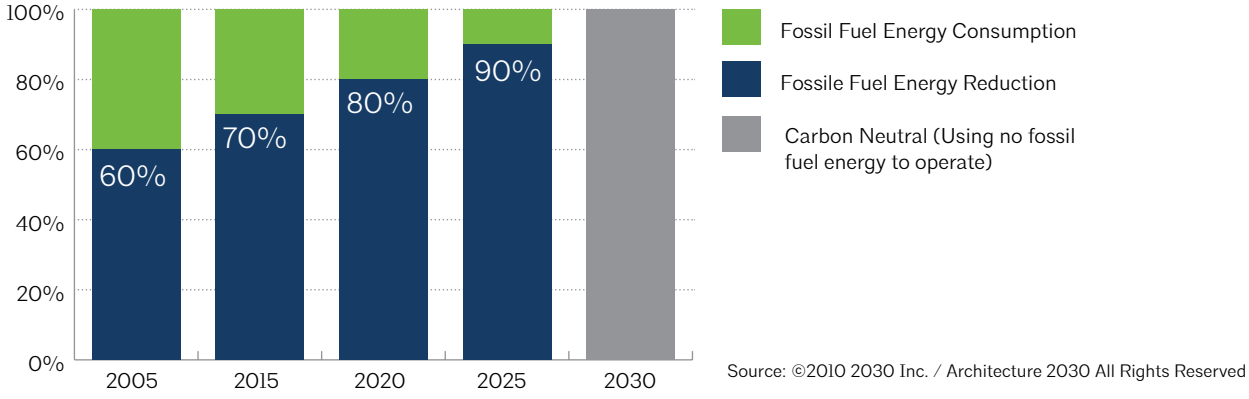


Table 2. Projects by Use Type

Project Type	2012 Ave. pEUI Reduction	2013 Ave. pEUI Reduction	2014 Ave. pEUI Reduction	GSF	No. of Projects	No. of Projects Meeting 60% Target
Assembly	37.7%	37.0%	31.4%	31,784,569	441	29
Higher Education	36.7%	37.1%	33.4%	34,815,252	412	45
K-12 Education	39.4%	43.3%	41.1%	33,264,619	402	47
Inpatient Healthcare	33.1%	33.1%	27.4%	158,752,068	556	11
Outpatient Healthcare	31.6%	29.6%	31.3%	25,813,942	440	14
Laboratory	43.2%	42.8%	45.2%	18,790,533	221	35
Office	37.0%	33.1%	46.7%	137,501,869	1,200	120
Residential	34.8%	33.8%	28.3%	83,202,531	465	37
Retail	25.7%	31.9%	21.4%	42,905,039	282	8
Mixed Use	42.8%	35.0%	37.2%	359,440,535	329	25
Other	30.2%	31.9%	44.4%	95,446,308	359	33

FIGURE 3. 2030 Challenge Goals



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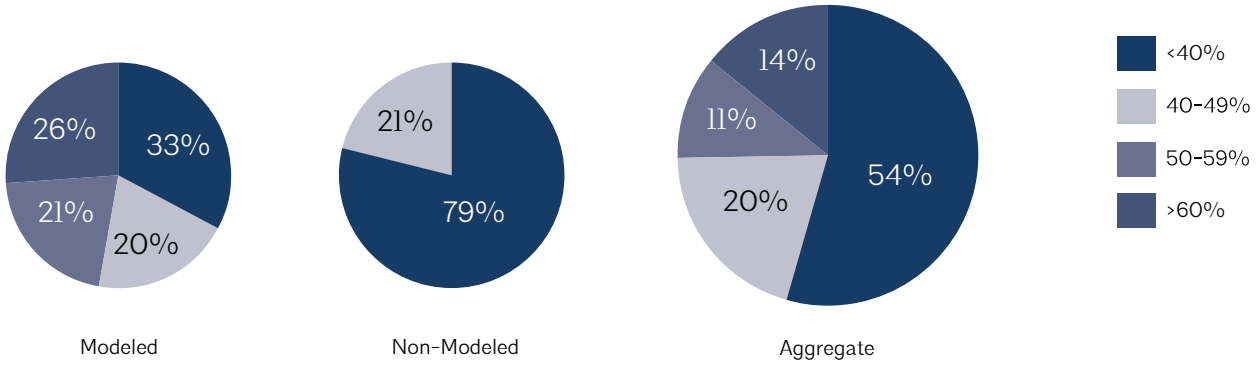
The AIA 2030 Commitment exists to build architects' capacity to reduce carbon through sharing information and accelerating change.

The AIA 2030 Commitment exists to build architects' capacity to reduce carbon through sharing information and accelerating change. Firms who signed the pledge aimed to design sites that consume 60% less on-site energy than baseline comparable sites through 2014. Projects in 2015 will aim for 70% reductions, and this aim will intensify until we see carbon-neutral buildings become standard by 2030 (Figure 3). As signatory firms continue designing lower-carbon sites, they can grow more ambitious and innovative in how they save energy. One in four projects in this report project energy-use reductions of more than 50% from the baseline. Deeper reductions than this are, of course, the AIA's goal. Eventually, we hope to see every project designed to achieve reductions target which increase 70% in 2015 and ramp up every 5 years until 2030. This remains an intention—and all projects will need to increase the reductions to 100% in the next several years in order to curb the profession's contribution to climate change.

AIA adopted Architecture 2030's challenge for architects to design a carbon-neutral built environment. And while this challenge increases, so does the community of architects working to meet it. Projects will need ingenious designs and far-sighted clients to reach this goal. A lot of firms in the Commitment have to satisfy clients on budgets with tight schedules, so they may not always get the chance to persuade clients to try advanced strategies for energy savings. Relatively few projects in this year's report are pilot sites funded by researchers or philanthropists—meaning that most of them must compete, on cost and schedule, with conventional work.

Importantly, this year's data teaches us that early, frequent modeling of projects makes a big difference to the degree to which audacious goals can become part of real buildings. Nearly 50% of modeled projects meet or come close to achieving the goals, whereas nearly 80% of non-modeled projects fall below the 40%

FIGURE 4. Percent Improvement by pEUI Reduction Bins



reduction range (Figure 4). We want members to learn more about energy modeling, an approach that can encourage more ambitious energy-saving design. The complexity and urgency of the AIA 2030 Commitment makes early, iterative energy modeling a basic part of design.

The AIA 2030 Commitment contributes to this effort by serving as a component of an overall toolkit to achieve carbon neutrality in all U.S. buildings by 2030. More resources and education can come to firms through the AIA, which keeps evolving to meet its members' needs in this new landscape. This education begins with a look under the hood of predicted energy-use intensity, our metric for progress in this report.

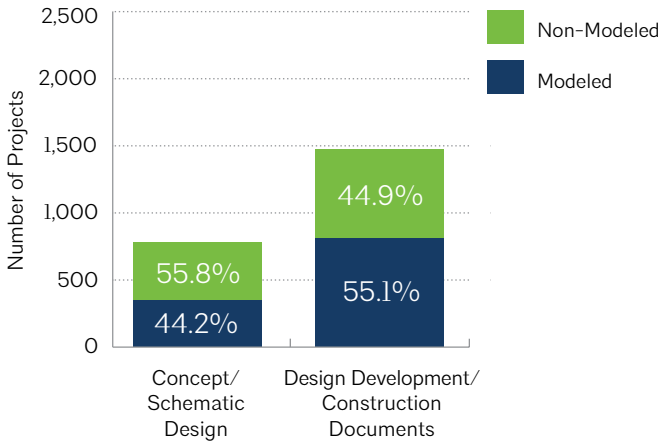
Value in the Energy Model

When design teams and their consultants work with energy models, they compare how different design scenarios play out in energy use. This kind of analysis helps a design team consider program, facade, massing and other defining elements in light of their likely impact on carbon use. The resulting numbers can shape internal discussions and client presentations; sometimes they can shape discussions with a client or owner's rep about a project's parameters. But critically, the numbers inform everyone on a design team about the scope of savings that might be feasible, allow teams to set targets, and help them regularly check their progress toward meeting these targets.

Once informed, design teams can more carefully target aggressive energy savings. It's telling that nearly four out of five non-modeled projects predict energy savings of less than 40% from the national baseline. With modeled projects, only a third of predictions were this cautious. This is because designing a project to meet code minimum standards doesn't incorporate how design decisions affect energy consumption. To make the AIA 2030 target energy reduction a driving factor throughout the design and construction process, it's important to use a model that can inform decisions and reconsiderations throughout design phases. Having only 44.2% of projects modeled in conceptual or schematic design means unfortunately limiting information about what these projects can achieve (Figure 5).

That kind of commitment to modeling may be new to some practitioners, who may need time and training to get into the habit of modeling early and frequently. It's

FIGURE 5. Total Number of Whole Building Projects by Project Phase (Modeled vs. Nonmodeled)



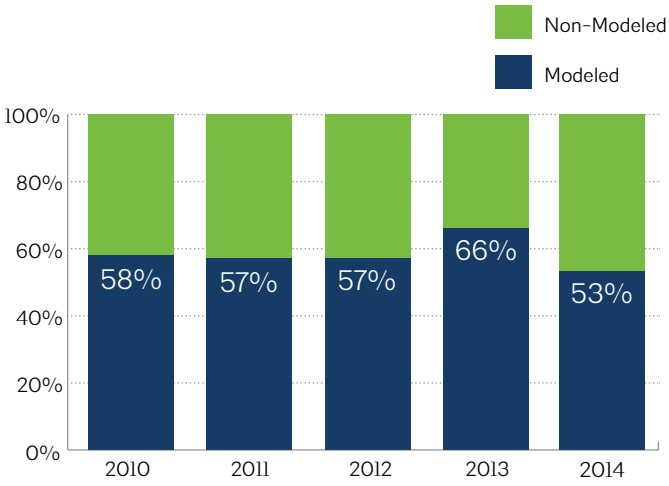
historically more common to build energy models to ensure code compliance, or to nominate a project for certification in LEED or another voluntary standard. That motivation may help explain why gross square footage in this year's report is split down the middle in early phases between modeled and non-modeled work, but 63% of project square footage in later phases are modeled. Firms are used to modeling for compliance and to earn certifications—modeling early is less familiar, for firms and for clients, and it's harder to find stories about why it works so well. Those stories are increasing, though.

This shows a missed opportunity. Having a model in place at a project's outset helps ensure that design teams will keep working on energy reduction throughout

a project's twists and turns. Without a model at the start, it's too easy for energy issues to get short shrift as a project changes. Indeed, a lower proportion of projects in the 2014 report have energy models than we saw in previous years' reports (Figure 6). Even though we see little movement, though, firms are hardly standing still. The overall flatness may reflect the encouraging fact that dozens of new practitioners are making the commitment, and are still learning how to incorporate energy modeling into practice. As modeling becomes more standard practice for these firms, they are likely to start doing it earlier to inform their designs. We hope to see modeling in early phases increase as we move toward 2030.

Energy reduction depends on several factors both within and beyond the architect's purview. Iterative modeling makes for more thorough analysis; as a team fine-tunes energy consumption estimates and figures out new ways of accomplishing client goals with less energy use, models can help clients think about their core businesses in energy-reduction terms as well. And that can help lead clients and tenants to more ambitious goals.

FIGURE 6. Percent Total GSF Modeled vs. Non-Modeled*



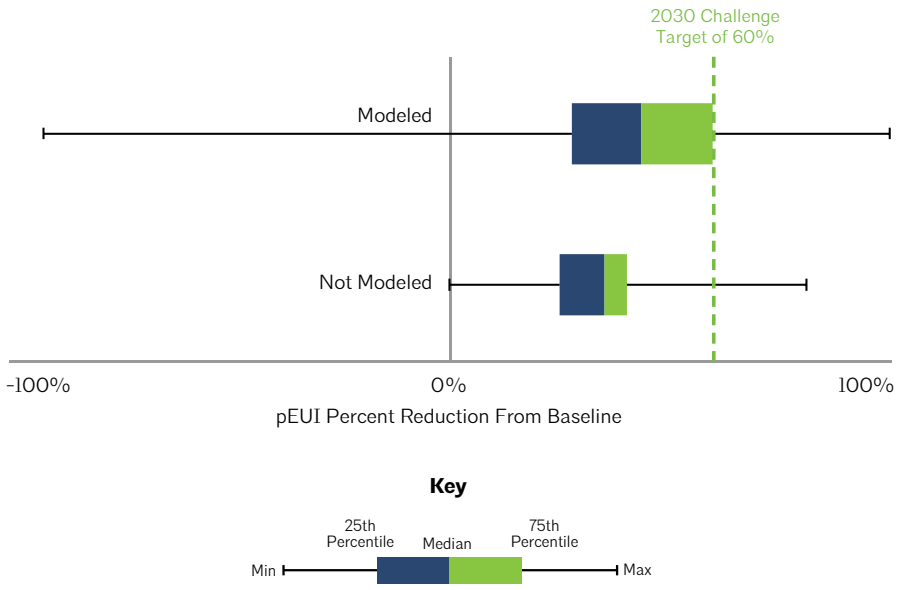
*This graph includes firm portfolio data submitted in aggregate.

The act of targeting steep energy reductions can prompt other architects to design for sharp drops in energy consumption. Projects that require less energy without sacrificing beauty or comfort can gratify clients and inspire competitors. If one design team targets a project like this, it's logical to think others will at least want to know what it takes to achieve such a design. When these architects share their models, a virtuous cycle commences. The pEUI, our metric since the AIA 2030 Commitment began, has currency as more architects share it and talk about how far it can go. In the AIA 2030 DDx, a scatterplot feature lets architects anonymously size up how their work's energy efficiency compares to that of other firms. That research can make for more accurate, and more aggressive, predictions in future projects.

Joining the 2030 Commitment changes focus. The incorporation of designing to energy targets with energy simulation changes architectural practice, and working from the outset with iterative energy models can change projects. The only way to achieve a net-zero project, for example, is to have an energy model in place from the outset. Models help teams and consultants find solutions to engineering problems, or new sources of energy savings. So even though these reported projects only sometimes include energy models, their inclusion in the Commitment makes modeling for all of them valuable as a source of data and ideas.

In that context, the fact that 21% of non-modeled projects predict exceed 40% improvement over the baseline (Figure 4) shows that the energy codes are becoming more stringent and helping the effort. Codes alone, however, are not enough. Even though we're nine years in on the move to carbon-neutral buildings, it takes time to rethink the design process and rewire the professional relationships architects maintain with clients, engineers, and contractors. So these are early days in the journey to zero-impact buildings, and any efforts to unify design with energy reduction will become more precise over time. The work before members in the 2030 Commitment involves finding a path to consistent,

FIGURE 7. pEUI Reduction Modeled vs. Nonmodeled*



*Note: A statistically negligible portion of outliers were removed from the dataset for legibility of the graph.

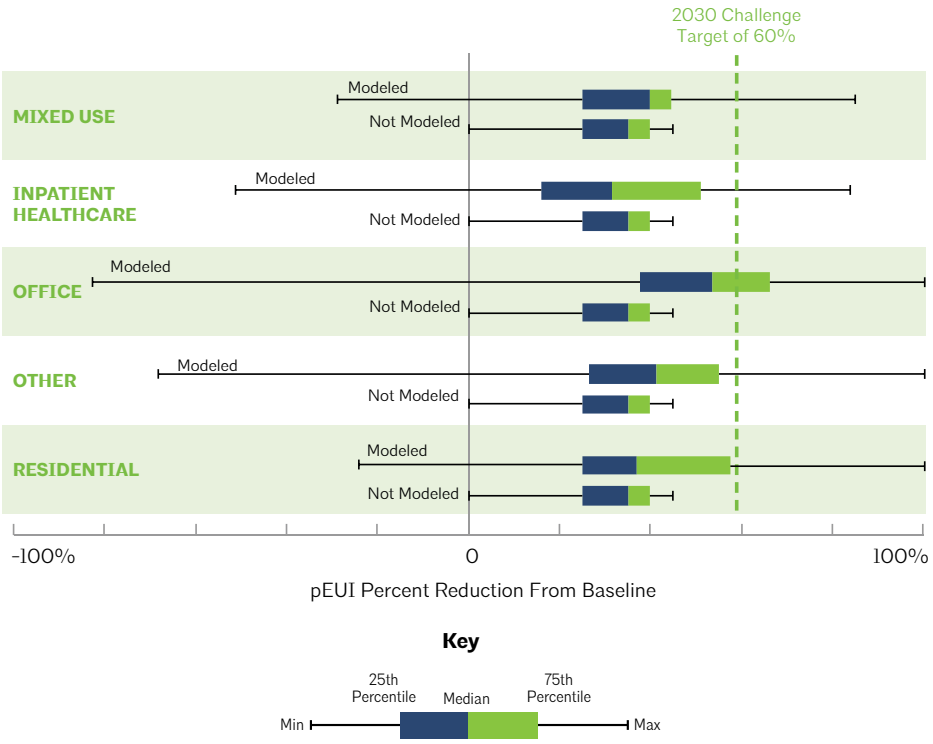
expanding drops in the energy use of the projects they design and certify. That path runs through modeling.

Iterative modeling, like iterative design in general, brings a team closer to a systematic way of tracking progress. A firm in the Commitment can build a thoughtful model early in the process, share it with a team and clients as the project evolves, and keep iterating the model as the project proceeds. Architecture can point the way to lower energy use more clearly if energy use is modeled throughout design phases.

The AIA continuously strives to find new ways to analyze the 2030 data and explore the story it tells; this year we evaluated quartile performance between modeled and non-modeled projects. Overall, the third quartile of modeled projects is remarkably close to meeting the goal; while 25% of the modeled projects exceed the goal. Interestingly, outliers of the modeled dataset range between 100% above the baseline to a 100% reduction or net zero (Figure 7). The negative performance speaks to the importance of establishing a reliable baseline for a project. Some project programs don't align directly with the national average baseline; for example office projects that include energy intensive server or security monitoring spaces will have an artificially low baseline compared to the actual building use. Those outliers could also include international projects with different climatic impacts than are accounted for in the U.S. baseline.

Digging more deeply into how different types of projects perform gives insight into how various sectors are able to address efficiency goals. The top 5 project types based on GSF were evaluated for their performance. A large portion of projects that fall into the 75th percentile (approximately half), for office projects exceeds the 2030 target—which means that over 37% of office projects are performing better than the target. Residential projects perform fairly well, with the 3rd quartile coming close to the target—which means that almost the entire fourth quartile (25% of projects) exceeds target. It is also noteworthy that the outliers for Office, Residential and Other project types are predicted to achieve net zero. Fewer Mixed-use and Inpatient healthcare projects meet the target level (the target rate sits well within the 4th quartile or the top 25% of projects) reflecting the added level of effort needed for these complex project types (Figure 8). The Other project category includes projects ranging from ports of entry to correctional facilities to data centers. The AIA is working to better incorporate the wide variety of project types into the program to more accurately reflect the range of projects that exist in the built environment.

FIGURE 8. pEUI Reduction Modeled vs. Nonmodeled by Use Type*



*note: A statistically negligible portion of outliers were removed from the dataset for legibility of the graph.

Various team members are responsible for modeling depending on the project and team. The AIA encourages architects to incorporate energy simulation into their practice to accommodate iterative analysis as design happens and eliminate the lag time in communication between a design team and consultant. Of the 957 projects with data on which team member performed analysis, twelve percent were simulated by the architectural team. Twenty-six percent of energy modeling performed in early design phases were performed by architects where only about twelve percent of modeled in detailed design phases were run by architects (Figure 9).

In this light, the AIA is agnostic about what tool a team uses; any commercially proven modeling tool adds value. Architects and their collaborators use an array of simulation software to gauge how a design will likely use energy (Figure 10). These tools can come as standard software, feature-rich apps, or complex proprietary datasets. Choosing which one most thoroughly assists in design decisions in a particular project will become part of architectural work. It's relevant to color, massing, orientation, and materials. The AIA encourages members to try different tools and use the ones that most thoroughly fit their needs. Ideally, architects should model early on their own or in consultation with consultants, and in this way become fluent in tools that most closely fit the project at hand. Often, engineers take over the modeling when it's time to submit a project for code compliance or a rating certification.

Models are also valuable because they give detail to architects who want to make their own low-carbon projects happen. The story a model tells about a project's development offers clues and warnings to future designers. Total square footage or total number of reported projects will change from year to year, as large projects in the pipeline skew the numbers. The heartening story comes out in the number of firms reporting. As that number grows, we see that practitioners have become more willing to have clients evaluate them based on energy savings. A model creates a roadmap and a trail through a project's evolution.

The projects submitted in 2014 cover the world and crisscross a range of building types. When teams model their energy use, they help each other see where and

FIGURE 9. Team Member Responsible for Energy Simulation by Design Phase

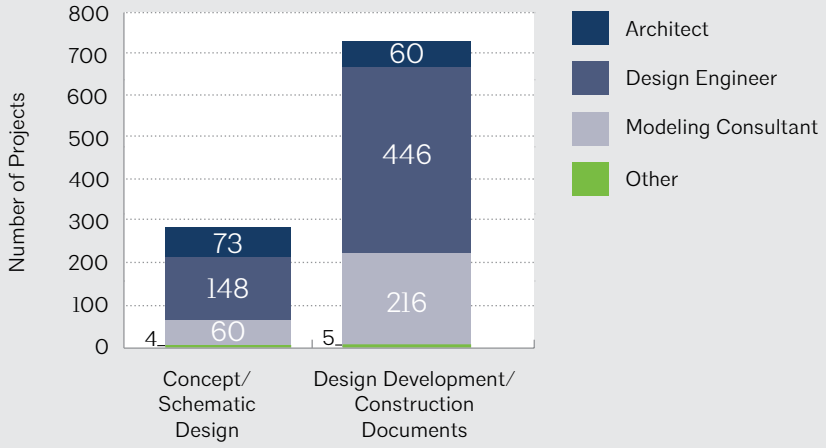
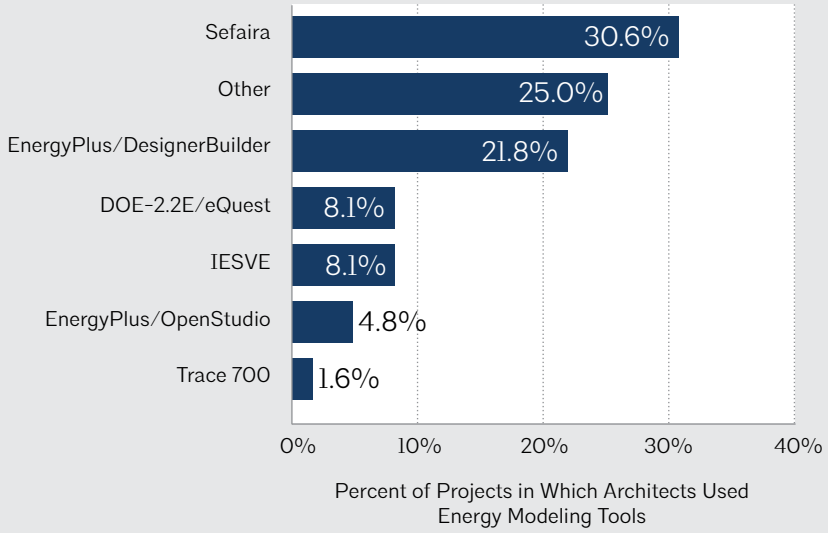


Figure 10. Energy Simulation Tools Used by Architects



The AIA 2030 Commitment is propelling change in the profession, and the AIA 2030 Design Data Exchange (DDx) is gearing up to foster more cross-pollination of ideas, techniques, resources, and skills.

how energy savings can stay in the project even if other aspects of the design change. They also show new paths for collaboration.

Firms are learning to make energy modeling a key skill in the design process. That doesn't mean architects are necessarily becoming expert modelers, or at least expert modelers on their own. In a majority of reported projects, a design engineer or consultant takes responsibility for the model. That means more chances for architects to provide their unique skills as part of a robust team. If a practice chooses to involve a consultant to manage building an energy model, they should involve the modeler as early as if they were working with an interior designer, lighting consultant, or branding specialist. This means facilitating thoughtful meetings and making sure energy savings get equal consideration with other goals the client has stated. Modeling pays in all project types by helping design teams check to see whether a project is on track to meet its stated energy-reduction targets.

More vitally, models are sources of data. Data in turn becomes a measure of how much carbon architects are steering out of the atmosphere. It creates chances to see what's working and should scale, what's working but most effective in specialized contexts, and what's not working. The AIA 2030 Commitment is propelling change in the profession, and the AIA 2030 Design Data Exchange (DDx) is gearing up to foster more cross-pollination of ideas, techniques, resources, and skills. Modeling projects from the start, and charting where the design needs to change or adapt, enriches this culture of analysis and innovation. The climate crisis that spurred the AIA 2030 Commitment came about from a lack of awareness of causes and effects. Our response to it should model, and document, causes and effects with great care.

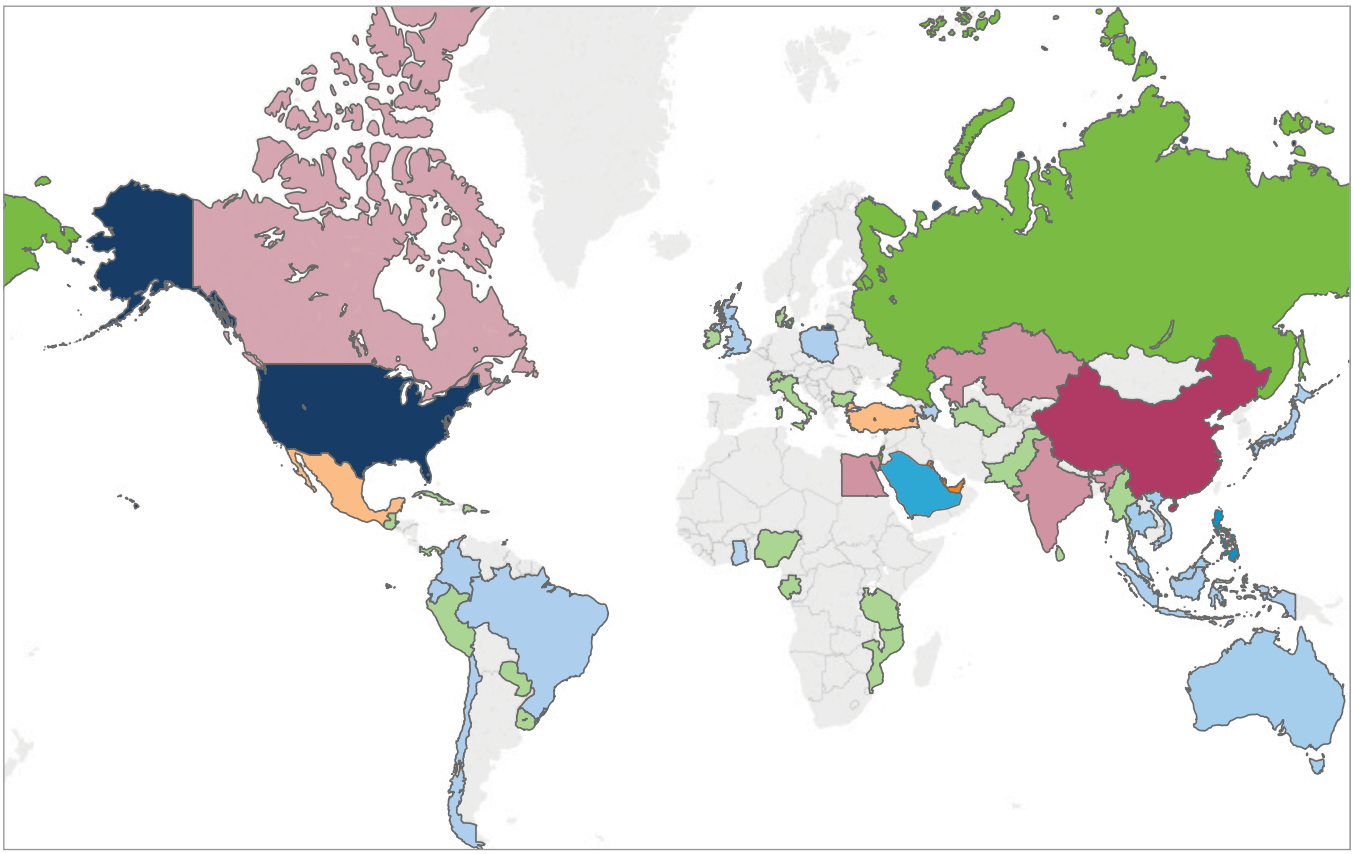
An International Shift

The world's people do more living and working in cities than in any other kind of community, and they do more and more learning and trading across international boundaries. While American architects still enjoy prominent exposure and unrivalled tools, the world is becoming the living lab for energy-efficient design.

An entrepreneur with a meeting in Azerbaijan, a merchant or high schooler or senior citizen in China, and a surgeon in Nigeria will all spend time in AIA 2030 Commitment projects in the future. So will patients, students, vacationers, and people in all phases of life throughout the world. Like people do now, they'll experience these sites as places for the events that define their lives—not as pilot sites where they've agreed to serve as test subjects for a new energy scheme. By keeping track of projects in more than 50 countries (Figures 9 & 10), member firms are helping trace how policies and practice in different places affect the speed or nature of change.

These global projects include a notable share of net-zero buildings (Table 3, Figure 11), which involve serious investment of intellect and capital. Many of them include sites like hospitals, universities and office complexes that will become magnets for growth in exports and international brands. These are projects with a lot of political and regulatory challenges, so they will proceed on different schedules. But as net-zero projects, they are all likely to draw strong political and media attention. That makes their presence in this reporting commitment a boon to practitioners around the world. Those practitioners prove that carbon-free buildings can be functional and fantastic places. They will set the standard for entrepreneurs, patients, students and seniors in a climate-stressed world.

Figure 11: International Projects by GSF



GSF Whole Building-CALC

- Null
- < 0.5M
- > 0.5M
- > 5M
- > 10M
- > 20M
- > 30M
- > 50
- > 100M
- > 400M

Figure 12: International by Number of Projects

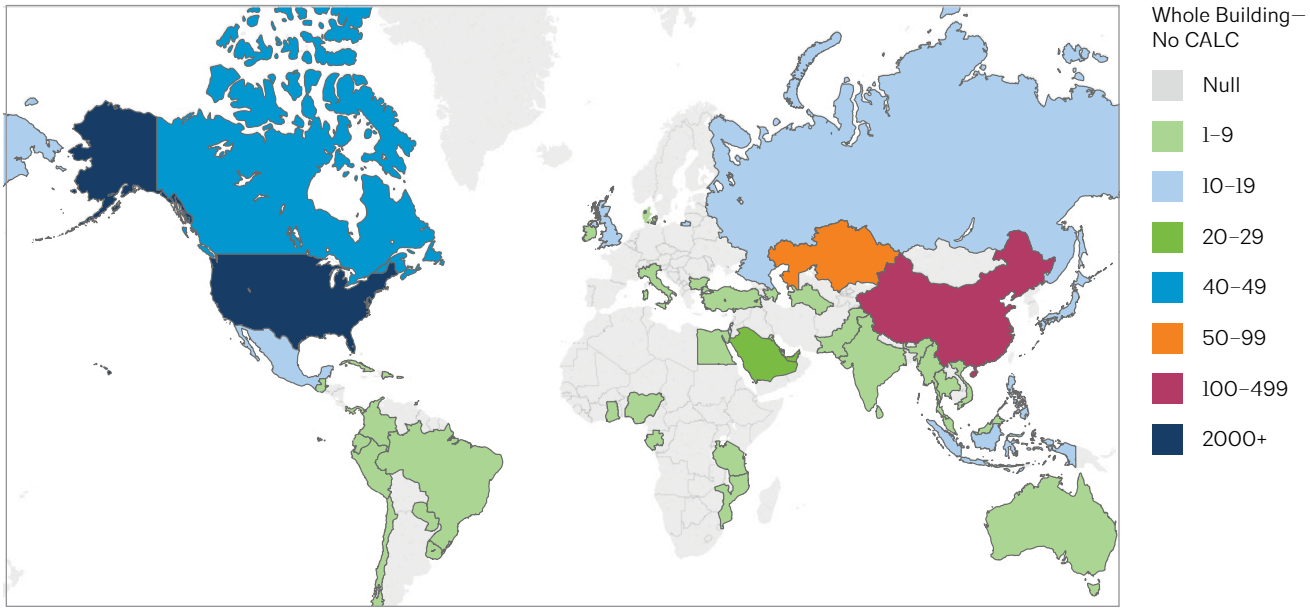
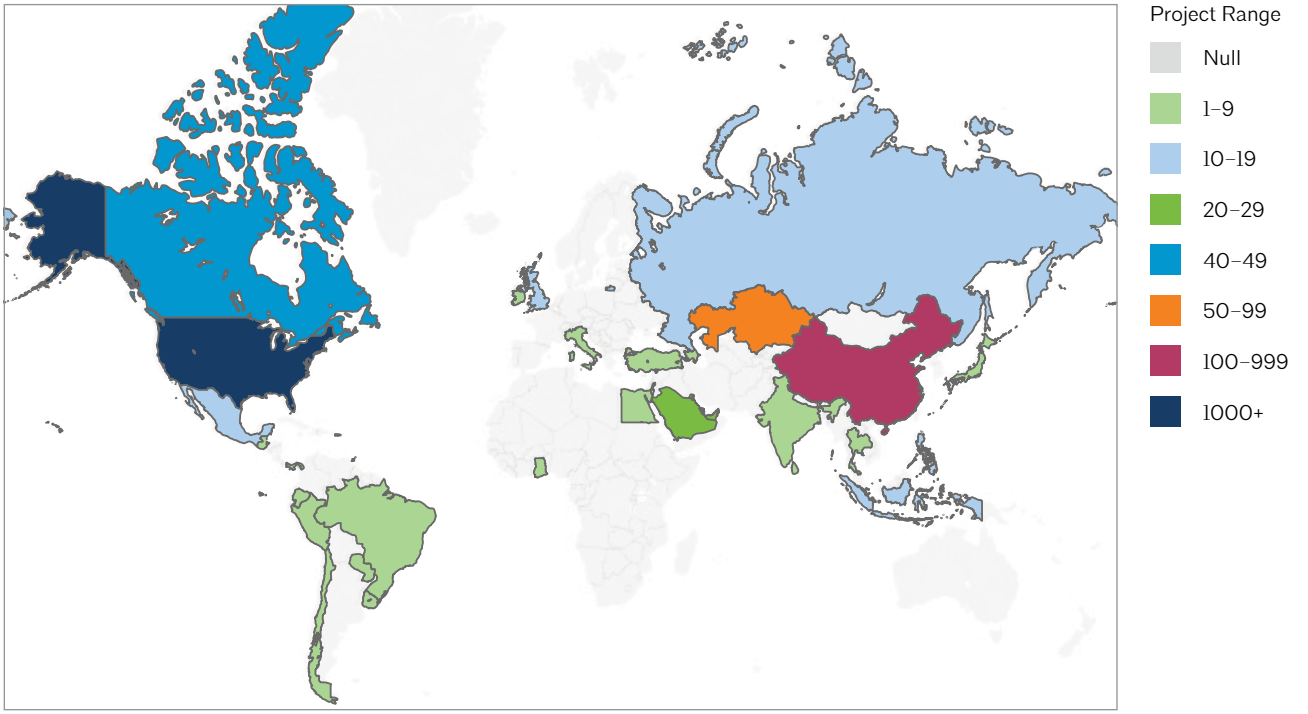


Figure 13: International Net Zero Projects by Number



A Look Inside the AIA 2030 Commitment Data

The world in which these projects develop already looks more stressed than the one the AIA Board of Directors confronted in 2005, when its members issued a Sustainable Architectural Practice Position Statement that set a goal of carbon-neutral new buildings by 2030. In the nine years since, Europe has seen deathly hot summers and the northeastern United States withstood 12-foot storm surges, while New Orleans made remarkable recoveries from the structural failures that followed Hurricane Katrina. The United States and China signed a carbon-control pact. In sum, the world clearly became a place where carbon reduction was an obligation for all parties.

In this transition year, while most firms reported project-level information, a few combined aggregate data across their whole portfolio. This reporting inconsistency is reflected in these report graphs. Those graphs that include the aggregate portfolio data are noted. In either case, we see a need for more projects and more modeling — and we also see more firms embracing the goals we set out with the 2030 Challenge. Firms will continue encouraging and learning from each other. Those graphs that show the project-level data give the industry a more in-depth look at program performance and impact.

The data measures predicted energy use intensity from energy used at the site level. This is the energy flow that an architect can meaningfully control. We don't task architects with reducing the level of fossil fuel in their local utility, instead focusing on where architects have the most impact. For that reason, the Commitment measures predictions of the amount of energy a site requires per square foot, or site pEUI. A better-detailed energy model gives design teams a clearer target, which improves the odds of a successful project. More successful projects, in turn, influence how many design teams and firms to compete on efficiency.

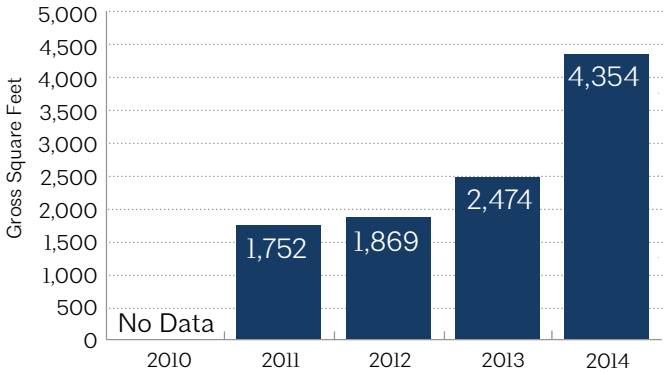
In this context, the share of projects or gross square footage meeting the 60% pEUI reduction target is one of several important indicators. The number of firms joining the Commitment and the range of project types active under its rubric hint at something bigger. With a change in the climate comes a reckoning about what it means to design places. The scope of firm size and project type in this year's data covers a wide range of practices and markets. Through this effort, reporting

Table 4. 2014 Data at a Glance*

2.4 B	Total GSF	50% increase
4,354	Total Projects	78% increase
36.9	Mean pEUI Reduction	2.7% increase
11.4%	% GSF Meeting the Target	4.3% increase
53.0%	Percent Total GSF Using Energy Modeling	13% decrease
413	Number of Projects Meeting 60% Reduction	3% increase
197	Number of Net Zero Projects	270% increase
3,837	Total Interiors Only	
22%	Mean LPD Reduction for Interiors Only Projects	3% increase

*This table includes firm portfolio data submitted in aggregate.

FIGURE 14. Total Number of Projects in an Active Design Phase*



*Active design phase denotes conceptual, schematic, design development, or contract document phases.

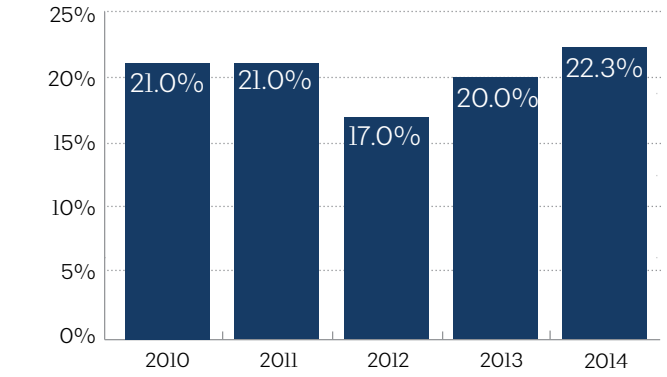
firms are affecting a critical switch. They're bringing about the day when climate-smart architecture looks exactly like smart architecture.

And that shift plays up the importance of making energy models early and evaluating repeatedly in a project. Consider what happens in conceptual and schematic design: choosing a cladding, arriving at a mass, pinpointing a façade, and computing the fossil-fuel use of all these things. One of these things is not like the other, which is why the architects who have joined our Commitment are changing what it means to enter our profession. Big and small, public and private, clients and design teams are grappling with the challenge of designing for carbon constraint. Even as we see fluctuation in the share of projects meeting the target or using energy models, we see reasons to believe that firms will do more modeling as the Commitment grows. Reducing carbon use will become more of a mandate as climate change intensifies.

Making this commitment, in a marketplace that depends on fees rather than research grants, means making a new deal with clients. Targeting energy savings becomes an element of design. A computation of a design's likely need for on-site energy affects a shape or volume or other big move. Even though these big moves can't force occupants to use energy efficiently, they make efficiency innate and advance the case for beautiful, functional design that flows from a mandate to use less fossil fuel.

This shift is happening as the program grows exponentially. More projects than ever were reported in 2015. The number of whole building projects reported grew by 78%, with nearly 4,400 reported globally (Figure 14).

FIGURE 15. Mean LPD Reduction*

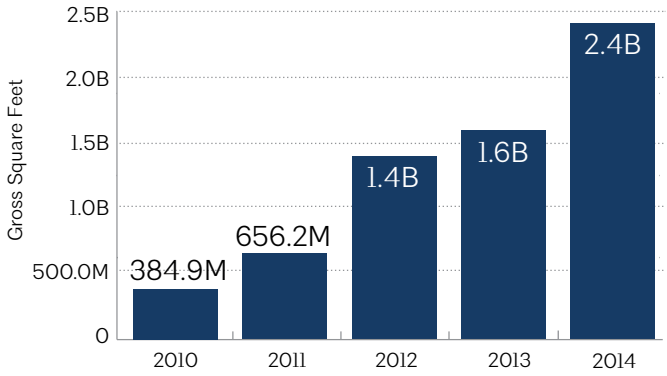


*This graph includes firm portfolio data submitted in aggregate.

Another 3,837 interiors-only projects were submitted, and in aggregate achieved a 22.3% reduction (Figure 15) over the ASHRAE lighting power density baseline (reference Appendix 2). Whole building and interior projects cumulatively represent 2.4 billion square feet (Figure 16), a 50% increase from 2014. This growth underscores the impact of the 2030 Commitment program, American architectural practice, and the potential to curb carbon emissions globally and mitigate climate change.

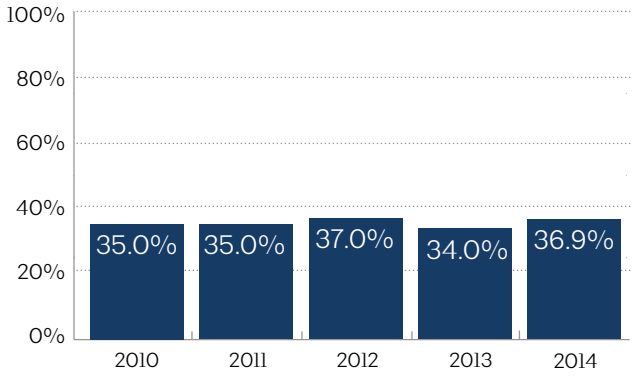
The profession is still acclimating to the opportunities this new focus brings to the design process, which is reflected in the flat progress toward the 2030 goals (Figure 17) with only 11.4% of projects in aggregate meeting the goal (Figure 18). The AIA's reduction targets may stay on the optimistic end of doable because the climate crisis obliges us to work fast and make deep

FIGURE 16. Total Project Area Reported in GSF*



*This graph includes firm portfolio data submitted in aggregate.

FIGURE 17. Percent Mean pEUI Reduction from the National Average*



*This graph includes firm portfolio data submitted in aggregate.

cuts. They also may reflect architects' awareness that users, utilities, and suppliers greatly influence how much fossil-fuel energy a project uses once it's built or retrofitted. But even carefully set or beatable targets, in aggregate, show a bold move: toward a profession that thinks in terms of energy savings from the first client meeting.

The way AIA analyzes this data has evolved in line with the trend toward iterative modeling. We are moving away from simply aggregating projects reported each year and focusing on analyzing how firms become better at energy modeling or targeting over time. The trend in number of reporting firms, or use types, highlights where knowledge and best practices are growing. This in turn shows AIA, and its chapters, what our communities need in training, partnerships, and professional development in order to build their 2030-tuned practices. In 2014, the AIA renewed its commitment to energy-efficient design by renewing its Board position supporting the 2030 goals, as well as other sustainability issues such as materials transparency, design and health, and resilience.

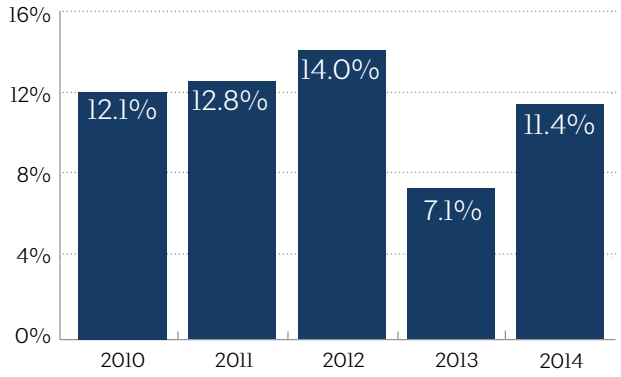
The AIA continues its efforts to support sustainable and efficient design through development of the AIA 2030 Design Data Exchange, and it furthers this commitment to the industry by working with Architecture 2030 and AIA Seattle to deliver the AIA Professional Series on-demand through our AIAU education platform. The first course of the AIA+2030 Online Series launched in the fall of 2015 and rose to the top 10 courses offered on AIAU within its first month. This effort reaffirms our belief that energy modeling functions as a core skill for the carbon-constrained world.

The need for change is vast and urgent: even as more projects meet and exceed reduction goals, overall progress has been minimal. We are involving more projects and more firms than ever, and the next step is to make energy modeling and energy consumption reduction a part of each firm's design process.

The information in a robust energy model gives clues about technique and assumptions that can make for better discussions. As those discussions guide the design development process, they can foster better team procedure and, eventually, a broad-based professional commitment to energy saving. Joining the AIA 2030 Commitment means becoming a showcase. That is an easier ask when you can use a model to define your design, not only to show compliance for third-party certification or code but to inform your design and then design your building to meet whatever standard your client wants or whatever you've set for your firm and project.

The reports show Commitment projects in as many types as you'd find in an average city. You can find many hospitals, universities and schools—buildings whose owners are explicitly or implicitly charged with acting in the public interest. But architects needn't restrict their carbon-reducing work to clients who have recognized that the world is changing. Part of the 2030 Commitment's logic, which we'll see at work in the AIA 2030 DDx, holds that architects can use design to bring about lower-carbon ways of living, regardless of their client. It's appropriate that public institutions show up early and often in architects' client lists; after all, government buildings can both draw on and earn public trust to invest in energy-saving systems. But these prominent

FIGURE 18. Percent Total GSF Meeting the 60% Target*



*This graph includes firm portfolio data submitted in aggregate.

places serve as a gateway to a much bigger potential energy-reduction market (Figure X).

The AIA and its partners strive to make each project more data-rich, with fuller information about inputs, methods and calculations. We have some work to do on helping member firms produce extensive, detailed reports that we can optimally analyze. Some projects may not begin with clear baselines, or may group together uses as disparate as stadiums and cold storage. We want to explore why there's noticeable headroom in retail settings for ambitious energy use reductions, and we have yet to evaluate the ratio of interior projects to whole building projects in the member reports.

All the partners in the AIA 2030 Commitment want the story of the next 15 years to be about greater, more ambitious energy reductions. These reductions should reflect architects' ability to motivate, synthesize and orchestrate collaborative projects. Architects needn't take pride in the model, or even own it. What matters is that it informs and precedes major design decisions.

These models can vault practice to new ambition and a new understanding of the profession. Architects can control how a building should work, even if they can't control how occupants will use it. They can educate clients about ways to attach that thinking to reality. The triumph of the Commitment is that energy saving is basic to an architect's brand, and that architects talk about it as fundamental to the project's execution.

We want the firms' reports to reveal data across their own portfolio and inform design across their practice, whether that is as a sole practitioner, a regional firm with numerous project studios, or a multinational firm with offices across the globe. The AIA 2030 Commitment can be used to evaluate the progress of individual architectural practice as well as the 2030 portfolio as a whole. And that will make for a clearer emergence of best practices in design as the tool for turning buildings into beacons of better performance in a constrained climate.

The AIA 2030 Design Data Exchange will carry this story forward. As the AIA 2030 Commitment becomes part of basic practice for more firms, and part of basic consultation for more clients, expect to see more models—and more revisions, and more dreams and inventions—as those models evolve.

Conclusion

The AIA 2030 Commitment grew in 2014. Its ranks include more of us, and more of our square footage is coming online under its carbon-reduction goals. Like any transformation, the Commitment may run into some headwinds, and may look more confident in some years than others. We are confident, though, that we are moving into a carbon-capped profession with our ingenuity and effectiveness in place. The 33 firms who joined the Commitment in 2014 bear witness to architecture's pledge to a vital cause.

Appendix 1: New and Reporting Signatory Firms

2014 NEW 2030 COMMITMENT SIGNATORY FIRMS

a.m.Benzing

B|W|B|R

Bennett Benner Partners

Bentel and Bentel

Centerbrook Architects and Planners

CO Architects

Davis Partnership Architects

Engberg Anderson

Farr Associates

Frank Harmon

Garrison Architects

Goody Clancy

Guidon Design

HarrisonKornberg Architects

Henry Schadler

Integrated Architecture

Interface Engineering—San Francisco

JMK Architects

Jones Design Studio, PLLC

Kathy Shaffer

Kiss + Cathcart

MWM DesignGroup

nARCHITECTS

OPN Architects

Overland Partners

Perkins Eastman

Peter Davis Architect

PLUMBOB

Positivenergy Practice

RBB Architects

Ronald Schmidt & Assoc.

Smith-Miller + Hawkinson Architects

THA Architecture

2014 SIGNATORY FIRMS REPORTING FOR THE AIA 2030 COMMITMENT

Adrian Smith + Gordon Gill Architecture

Albert Kahn Associates

Alliiance

Ann Beha Architects

ARC/Architectural Resources Cambridge, Inc.

Archimania

Ayers Saint Gross

B|W|B|R

Bard, Rao + Athanas Consulting Engineers LLC

Bergmeyer Associates

BKSK Architects

BNIM Architects

Boora Architects

Braun and Steidl

Buro Happold Consulting Engineers Inc.

Callison

CannonDesign

Coolearth Architecture Inc.

Cooper Carry

Crenshaw Consulting Engineers, Inc.

Croxton Collaborative

CS&P Architects Inc.

Cuningham Group Architecture, Inc.

Cunningham | Quill Architects

Danciart Architects

Dattner Architects

Davis Partnership Architects

Dewberry

DLR Group

DSGN Associates, Inc.

DWL Architects + Planners

EHDD

Ellenzweig

Engberg Anderson

English + Associates Architects, Inc.

Epstein

2014 SIGNATORY FIRMS REPORTING FOR THE AIA 2030 COMMITMENT (CONTINUED)

Eskew+Dumez+Ripple

EwingCole

EYP

Farr Associates

FXFOWLE

Gensler

GGLO

Goettsch Partners

Goody Clancy

Gresham Smith and Partners

Guidon Design

GWWO, Inc./Architects

Hahnfeld Hoffer Stanford

Hartshorne Plunkard Architecture

HDR, Inc.

Helix Architecture + Design

High Plains

HKS

HOK

Hord Coplan Macht

Jacobs Global Buildings

Jones Design Studio, PLLC

Jones Studio, Inc.

Kipnis Architecture and Planning

KMD Architects

L.M. Holder III, FAIA

Lake|Flato Architects

Landon Bone Baker Architects

Leddy Maytum Stacy Architects

Legat Architects

Lehrer Architects LA, Inc.

LEO A DALY

Lionakis

Little Diversified Architectural Consulting

LMN Architects

Lord, Aeck & Sargent

LPA, Inc.

LS3P

M.C. Harry & Associates

Mahlum

Mazzetti

Metrix Engineers

Mithun

mode associates

Moseley Architects

MSR

NBBJ

o2 Architecture

OPN Architects

Orcutt Winslow

Overland Partners

Paul Poirier + Associates Architects

Payette Associates, Inc.

Pei Cobb Freed & Partners Architects LLC

Perkins Eastman

Perkins+Will

Peters, Tschantz & Associates, Inc.

Pickard Chilton

Positivenergy Practice

Quattrocchi Kwok Architects

Quinn Evans Architects

R.G. Vanderweil Engineers

RB+B Architects, Inc.

RDG Planning & Design

Ross Barney

RVK Architects, Inc.

Sclater Architects

SERA Architects

Serena Sturm Architects, Ltd.

Shepley Bulfinch

SHP Leading Design

Skidmore, Owings & Merrill LLP

SLATERPAULL Architects

Smith Seckman Reid

SmithGroupJJR

SMMA

Solomon Cordwell Buenz

Steffian Bradley Architects

Studio Ma

STUDIOS Architecture

THA Architecture

The Beck Group

The Miller Hull Partnership

The Sheward Partnership, LLC

The SLAM Collaborative

Thompson Young Design

Thornton Tomasetti

TLC Engineering for Architecture

TRO Jung | Brannen

Valerio Dewalt Train Associates

VOA Associates Inc.

Wallace Roberts & Todd

WBRC Architects-Engineers

Westlake Reed Leskosky

Wight & Company

William Rawn Associates, Architects, Inc.

Willoughby Engineering LLC

Wilson Architects

WLC Architects, Inc.

WRNS Studio

Yost Grube Hall Architecture

ZeroEnergy Design

ZGF

Appendix 2: How Does the AIA 2030 Commitment Measure Energy Efficiency?

The AIA 2030 Commitment is measured using predicted energy use intensity to a baseline; metered energy use intensity (EUI) derived from the 2003 Commercial Building Energy Consumption Survey and the 2001 Residential Energy Consumption Survey. Both surveys are administered by the Energy Information Administration (EIA) and include a representative sampling of U.S. building stock. Predicted energy use intensity (pEUI) is measured in KBtu/GSF/year.

The metric we use, EUI, reports a building's energy use per unit area in thousands of British thermal units per square foot per year (kBtu/GSF/yr). We get our "normal" building measure from the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS)—specifically the 2003 CBECS database. The CBECS serves as the widely adopted baseline EUI for measuring operational energy use and reductions. The AIA 2030 Commitment uses the term pEUI to differentiate from actual operational or metered energy use.

The distinction plays out in the report. Whereas the CBECS records actual use data from existing buildings, pEUI measures the intended or anticipated building energy consumption based on an energy simulation of the project's design. Additionally, reporting is based on site EUI which measures the energy used at the building site, as opposed source EUI. Source energy reflects what's used not only at the building level but also for electricity generation, transmission, storage. Source EUI is an important measure of energy—and a vital part of calculating "carbon footprint." However, the focus of this reporting is to start with analyzing something that architectural choices can influence: the intended energy performance by using site EUI baseline (derived from CBECS or other national surveys) for the design work of AIA member firms.

The math varies with each site. For each project that is not interior-only, we subtract the percentage reduction of pEUI from the average EUI and multiply that number by the project's gross square footage (GSF). The sum of these products is divided by the total GSF of the same projects, which gives us a weighted average percentage reduction from the average. This number represents the firm's progress toward the 2030 goals. The approach allows for two key features: first, member firms of differing sizes to report on an equal basis; and second, it emphasizes the importance of project size, as larger projects within a firm's portfolio have a larger impact.

For interiors-only design work, the AIA 2030 Commitment measures designed lighting power density (LPD). Generally, the ability of an interior design project to affect building EUI is limited mostly to lighting design. Since interiors only projects tend to not include HVAC system or envelope modifications, LPD is the criterion most applicable to this work. The LPD metric is the sum of wattage required for all lighting equipment (as calculated per American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) methodologies) divided by project area. The wattage (W) in the W/s.f. comes from the power rating of the lighting fixtures selected. LPD is different from actual lighting energy use (which could be determined if the lighting was sub-metered and the power for lighting was measured over time). LPD is also different from lighting use intensity

(LUI) which can be derived only from energy modeling, which is seldom employed for interiors-only projects.

On this score, we get our metrics from ASHRAE 90.1-2007. In this standard, installed interior LPD includes all power used by luminaires with a number of exceptions, including essential display or accent lighting, lighting that is integral to equipment, lighting specifically designed for use only during medical or dental procedures, and exit signs. ASHRAE 90.1-2007 offers two methods for determining a project's LPD and allowance: the Building Area Method and the Space-by-Space Method. The Building Area Method sets a single allowance for the entire project, while the Space-by-Space Method compiles varying allowances for multiple space types within a single project.

50 United Nations Plaza
Leed Platinum Certified
HKS Architects. Photo by Blake Marvin

ASU Ploytechnic Academic Building
2012 AIA COTE Top Ten Green Projects Award
Image courtesy of Lake Flato. © Bill Timmerman

Above and Cover:
Surrey City Centre Library
Leed Canada Gold Certified Building
Bing Thom Architects
Photo by Nic Lehoux

The American Institute of Architects

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