# AIA 2030 Commitment

# 2015 PROGRESS REPORT

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Previous page:
© Warren Jagger
Project: the Biosciences Research Building at the National University of Ireland, Galway
Architect: Payette

# Key takeaways

> In 2015, the AIA 2030 Commitment goal intensified to a 70 percent reduction in predicted energy use intensity (pEUI) over the 2003 Commercial Building Energy Consumption Survey (CBECS). These are challenging targets and we are not keeping pace. In 2010, the first reporting year, we saw an average of 35 percent pEUI savings. In 2015, projects reported only an average savings of 38.1 percent, with 4 percent meeting the increased 70 percent savings target and another 3 percent meeting the earlier 60 percent reduction goal by gross square feet (GSF). This fails to respond to the pressures of the world in which we live, where carbon impacts increasingly threaten our well-being. Although we're not meeting the goals as a whole, an increasing number of projects are meeting the 60 percent—now 70 percent—goals, proving they're achievable.

> The AIA is helping architects hone firm portfolio performance by rolling out the 2030 Design Data Exchange (DDx). To help teams benchmark and target pEUI performance to drive improved energy efficiency, the DDx shows performance data at the firm and portfolio levels. This releases a range of new analytical aids to help one-person shops and multinational firms work smarter and integrate energy best practices into firm culture.

> For any project of any size, meeting the energy targets requires energy modeling; there is no code equivalent that reaches the targets. To meet these challenges, design teams must learn to build energy models early in the design process and analyze design decisions iteratively. This year 59 percent of the gross square footage in whole building projects—a roughly 15 percent improvement over last year—used energy modeling. That's significant progress, but not fast or far enough.

**> On the plus side, there was a greater-than-average increase in the performance of the projects designed with code equivalent targets rather than energy models.** Local jurisdictions are taking action to adopt stricter energy codes. In 2015, 30 percent of non-modeled projects exceeded 40 percent reduction over the baseline. That's due to increasing energy efficiency mandates. Codes are driving improvement from the bottom.

**> More architects are engaged in the 2030 Commitment.** In 2015, 366 firms were signatories of the 2030 Commitment and 152 firms reported—an 8.6 percent increase in reporting from 2014. More participation brings better data that let firms benchmark new projects against projects in the national portfolio. A world of more intense storms and flooding, longer droughts, deadlier heat waves, and increasing wildfires (U.S. Global Change Research Program, 2014) demands our best ideas and deepest efforts—which can flow from tapping our best data.

**To help teams benchmark and target pEUI performance to drive improved energy efficiency, the DDx shows performance data at the firm and portfolio levels.**

# Introduction

When today's babies grow up to snap selfies and take coffee breaks in dorms and apartments and museums and offices, they may wonder what those buildings' designers knew about the approaching tumult of climate change. To square our accounts with these clients-in-waiting, from here forward we need to design places that use less and less energy to support the activity in them. This demands a new culture in our firms that embraces data—and that begins with modeling and benchmarking their project energy needs early and often. Design becomes a quest for ample energy with less carbon.

Anyone born since the Commitment began will grow up in a world grappling with carbon addiction. Their teen years will coincide with the takeup from the United Nations' 21st Conference of Parties in Paris, where delegates from 169 countries agreed to work on flexible pathways to limit climate change, caused by carbon emissions, to a civilization striving to save at least 2 degrees Celsius and, preferably, 1.5 degrees Celsius. Nations and even cities are already charting their own courses to low-carbon prosperity. Many of them will look to architects for help in implementing their plans.

**Cumulatively, the energy saved from 2015 projects is approximately 21 million metric tons of greenhouse gas emissions, the equivalent of running six coal-fired power plants or powering 2.2 million homes in a year (EPA Greenhouse Gas Equivalencies Calculator).**

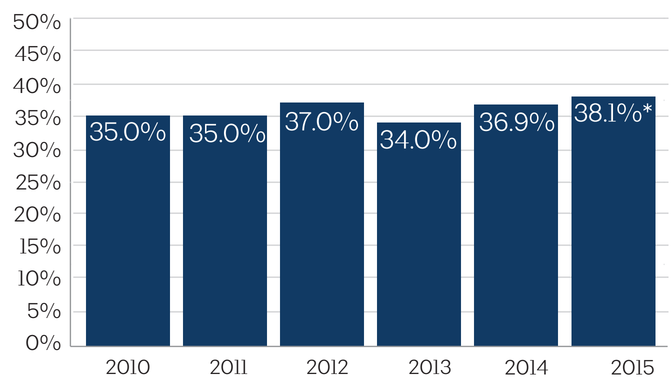
# A new tool

### From driving blind to using data maps

As a profession, we need new juice to set a quicker pace. Eleven years after a nonprofit advocacy group, Architecture 2030, rallied us and other building professionals to make carbon-neutral buildings by 2030, the average project in the AIA 2030 Commitment predicts energy use intensity savings of around 38 percent (Figure 1). This won't cut the ice (or stop melting icecaps), but we do see a source of strength in numbers. As our participation climbs, so grows the story we can read in participating firms' completed projects.

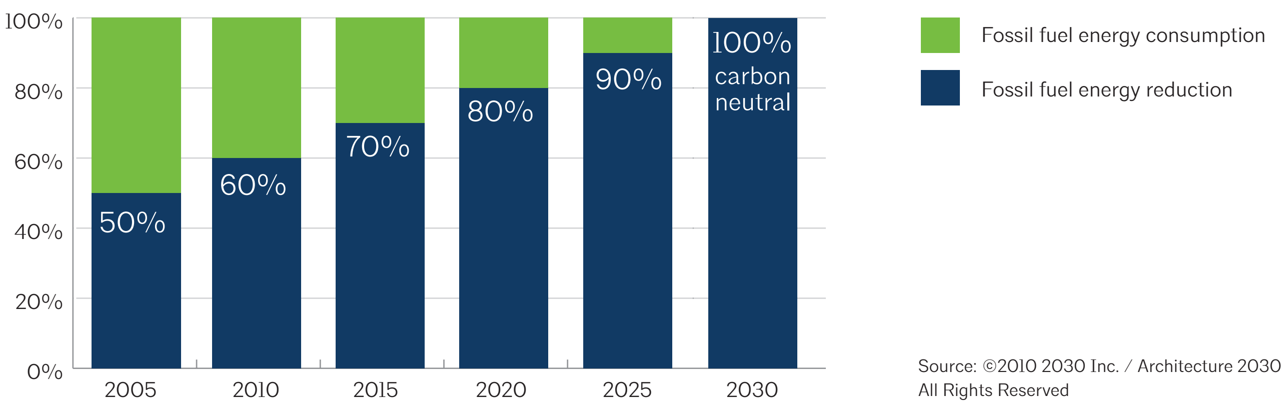
Let's take a moment to pull over and reread our map. Projects from 2010 to 2014 aimed to consume 60 percent less energy, measured through our pEUI indicator, than the 2003 CBECS baseline (See "Methods and Metrics" Appendix 2). Starting last year, the goal shifted to a 70 percent improvement (Figure 2), and

**FIGURE 1. Average pEUI reduction over reporting years**




*pEUI reduction savings for modeled projects have been modified to meet the minimum code equivalent savings. This modification increases the annual pEUI savings by 1.7%.

**FIGURE 2. 2030 challenge goals**

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by 2030 reporting firms will target net zero. In the first year of the increased target, only 4 percent of GSF is meeting the 70 percent goal (Figure 3). Not every firm has experience building iterative energy models, and not every client understands their value. But 93 percent of reporting firms had at least one modeled project, and there were 57 net-zero projects; we will continue to learn more each year from incremental successes.

If our car's engine is making rattling noises, wouldn't we do well to go for a tuneup? In 2015 the AIA launched the new 2030 Design Data Exchange (DDx) as a spiffy and useful architectural dashboard and web-based tool. Its data and visualizations show firms where they've been performing, where they can change to accelerate, and what they can try adding to sustain higher speeds of energy savings.

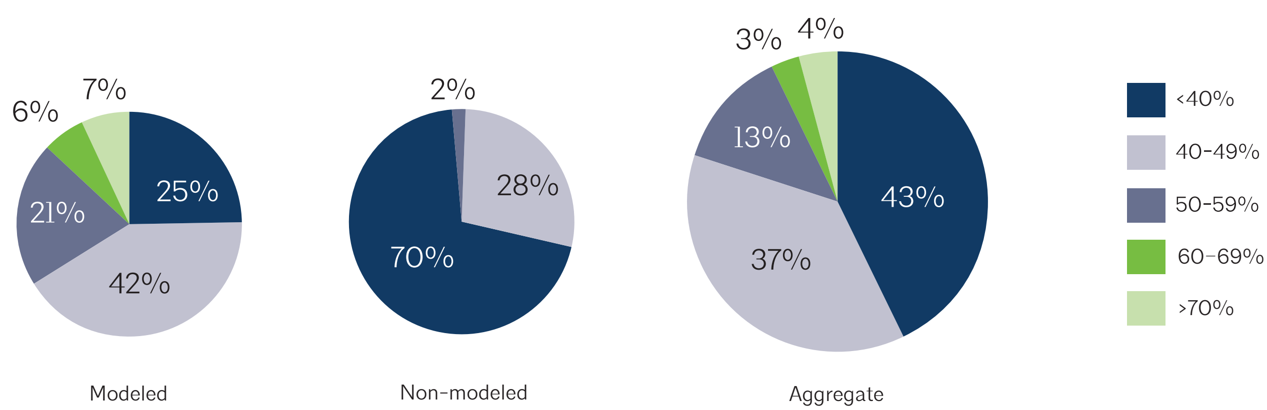
## For Your pEUIs only: learning from your data

Once you've joined the AIA 2030 Commitment, your firm can benchmark projects, track progress, and build on lessons learned. You can start each meeting with a look at a web-based archive of past projects in the DDx. It gathers and shows modeled performance results or codes equivalents against the program benchmarks.

The AIA is investing in the DDx because it knows that the design professionals have taken on more scientific skillsets, and that clients are learning to apply quantitative metrics when evaluating a design's value. As more computing power offers more stories about what design means for carbon emissions, competitive firms learn to make that data digestible. Like data feeds into Fitbits and sensors, data tracking portfolio performance over time make progress more visible and measurable.

The AIA hopes this makes for a broad spread of "a-ha moments" and confident innovations. Through reviewing data, and stories like the ones in this report, architects will do what they've always done, but with a stronger foundation of energy metrics. By benchmarking through the DDx (Figure 5), we'll understand where other projects fall and respond with which direction a building faces, how people will use it, and then take a hard look at data from previous years. Results from 2015—a year when energy codes started to look a little more stringent and our required pEUI drops became more ambitious—show we have more to learn. But looking at the data reminds us that architects can create deep and surprising and lasting value by making smarter buildings that build on lessons learned by our firms or through aggregated, anonymous industry data.

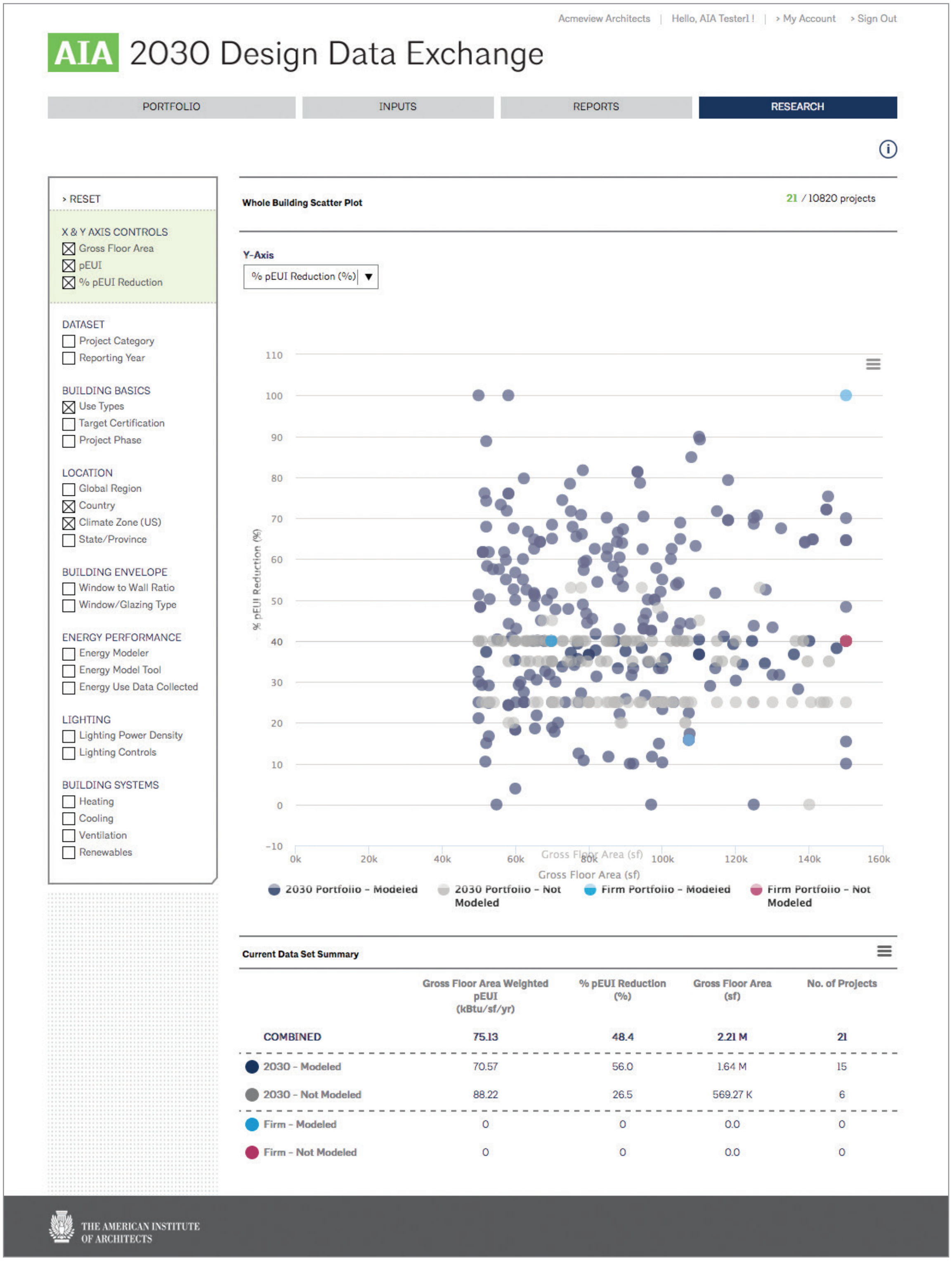
**FIGURE 3. pEUI reduction bins comparing GSF of modeled and non-modeled projects**



### FIGURE 4. 2015 data at a glance

| | | |
|---|---|---|
| **2.6 Billion** | Total gross square feet (GSF) | **8.3% increase** |
| **5,982** | Total number of whole building projects reported | **37% increase** |
| **2.2 Billion** | Total GSF whole building projects reported | **17% increase** |
| **4461** | Total number of interiors only projects reported | **16% increase** |
| **390 Million** | Total GSF interiors only projects reported | **19% decrease** |
| **38.1%** | Average predicted energy use intensity (pEUI) reduction—weighted by GSF | **1.2% point increase** |
| **7.2%** | Percent of total GSF meeting the 60% reduction target (previous target) | **4.4% point decrease** |
| **3.9%** | Percent of total GSF meeting the 70% reduction target (current target) | **NA** |
| **10.3%** | Percent of the projects meeting the 60% reduction target | **1.1% point increase** |
| **59.41%** | Percent of total GSF using energy modeling to predict energy consumption | **8.8% point increase** |
| **614** | Total number of projects meeting the 60% reduction target | **42% increase** |

**FIGURE 5. Energy benchmarking in the Design Data Exchange**



## Lake|Flato

Three times in its first year, the DDx has saved time on past project performance research for Lake|Flato, a firm based in San Antonio, Texas. That's a growing share of billings for a mid-size firm. "The fact that three have come up within one year," says AIA 2030 Working Group member Heather Gayle Holdridge, EIT, Assoc. AIA, "tells me that something is bubbling beneath the surface.

"When we're pulling precedents from the DDx, we are able to research how a building functions in terms of energy and water." says Holdridge. Quickly becoming energy detectives and predictors in building project energy models, and using those energy models to drive design objectives, architects are able to easily identify and convey the energy costs and benefits in all design choices.

"The DDx facilitates the design process by ensuring that design is not just about collecting precedent projects in terms of form or materiality or other aspects that are traditionally design-oriented," says Holdridge. "There may be some other building system that you consider from the forefront, and that becomes a real driver for the design." Tools such as the DDx are facilitating benchmarking, driving consideration of these options earlier in the design process, allowing architects more leverage to predict how buildings will perform.

In the profession, evaluating past performance has been a long-standing part of an architect's due diligence. "But without energy performance data at our fingertips," explains Holdridge, "it isn't always clear how a particular data point from a past project was relevant or relatable to a new project. This database makes it easier."

The DDx also promises to help sharpen projections of how designs can play out over time in terms of energy costs. Many firms, like Lake|Flato, use post-occupancy evaluations that rely on entries from tenants or owners in a questionnaire. "It's so much better to be able to compare that evaluation to what's predicted for the building." says Holdridge. "The tracking process helps us to be sure that we have a deliberate prediction—and something real to compare it to." Tracking demonstrates a firm's strong commitment towards getting better at lowering both carbon emissions and energy costs over time.

"The DDx also organizes the other projects that other firms are submitting," she continues. The data are anonymous, but useful. "You can search by project characteristic or feature, and grab some precedents—I'm really excited about the opportunity."

This resource, says Holdridge, changes the game for firms that use it. Entering and reporting data takes time, but the depth of data for benchmarking and analysis makes the time seem like a compelling investment. "I feel like every time we've demoed it, we've had people almost awestruck by how powerful it is," says Holdridge.

## Perkins Eastman

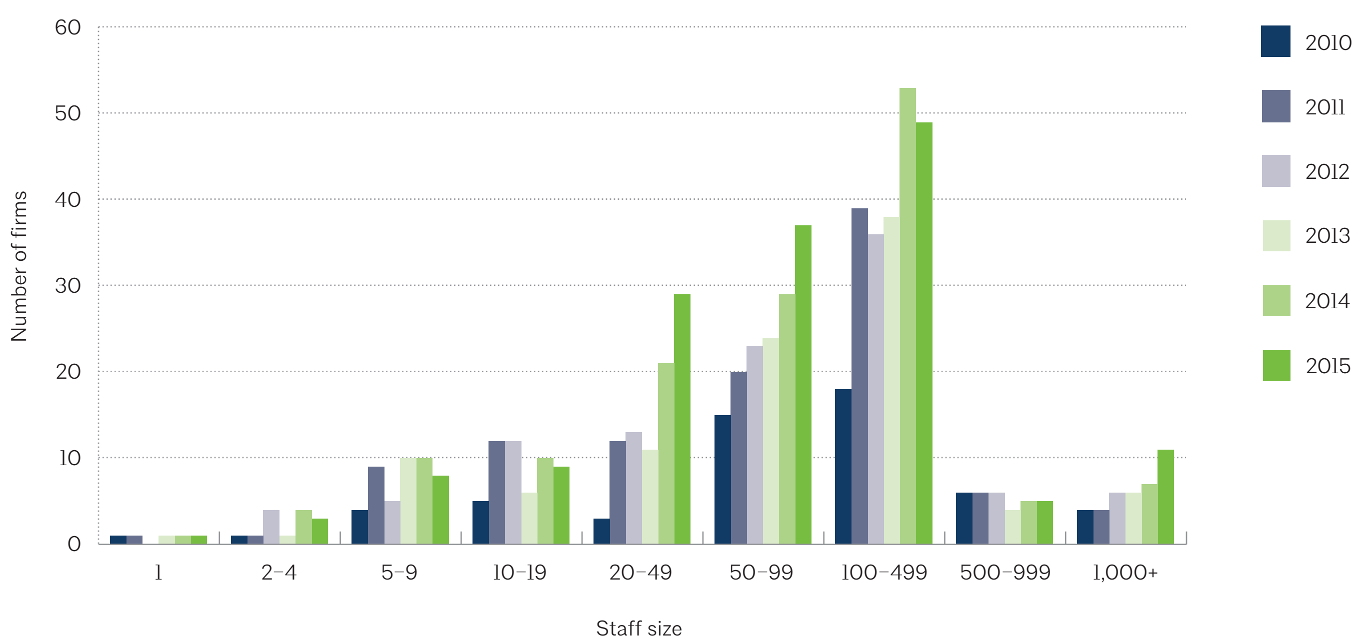
"Being able to see immediate results on how our projects are performing created a bit of a 'wow factor' that has gotten people within the firm excited and more engaged in a larger discussion of how all of our projects can reduce their energy consumption," says Melissa DeStout, project architect with Perkins Eastman.

A large firm with offices in many countries often functions like a suite of different firms. DeStout credits the DDx's graphics with making it easy and compelling to chew on different results coming out of the firm's many offices. The same switch can happen at small firms, too. Making an energy modeler a leader of the project team, and making energy performance into a key variable, becomes more feasible with like-minded firms sharing their experiments and results anonymously online. And those results can encourage experiments, which lead to more data. An infectious spirit and a virtuous circle can grow.

## What the ddx can drive

Anyone on a project team can look into the DDx and bring data from past work to initial design discussions. Instead of needing to produce a spreadsheet of other projects' predicted energy use intensity—or needing to task team members with tedious data collection—project teams can enter data so that firms can analyze different market sectors in line with the Commitment's goals. The new DDx web tool is used directly by teams working on the project, and provides a framework and lexicon for energy savings. This enriches discussions between engineers and designers as well as between designers and clients—useful to the broad range of firm sizes that report (Figure 6). In a small firm, data clarifies strengths and challenges. In a big firm, it reveals trends and tendencies to correct across a range of geographies. The data can flow more fully into the overall design process and be integrated into firm culture. As it absorbs more project data, the DDx can become a roadmap through tested approaches.

**FIGURE 6. Number of reporting firms by staff size over time**



# Why firms need to start (over) with energy models

The clear choice for firms that want to keep pace with Commitment goals involves becoming expert at creating and reading energy models. If architects don't reverse carbon emissions' growth around the world, future practice and design will evolve amid a swirl of increased drought, floods, wildfires, human upheaval, and shocks to the world economy (U.S. Global Change Research Project, 2014). And the hundreds of firms that adopt the goals will gain increased power to create value for clients and for society. It seems fair to read the mission to design for lower carbon emissions as a way to keep the profession relevant in the future while serving clients' needs today.

Only projects using energy modeling are capable of achieving the energy reduction targets of the 2030 Commitment. The good news is that the GSF and number of projects reported continue to increase as well as the proportion of GSF using energy modeling. This year 59 percent of the GSF in whole building projects, a roughly 15 percent improvement over last year, used energy modeling (Figures 7 and 8).

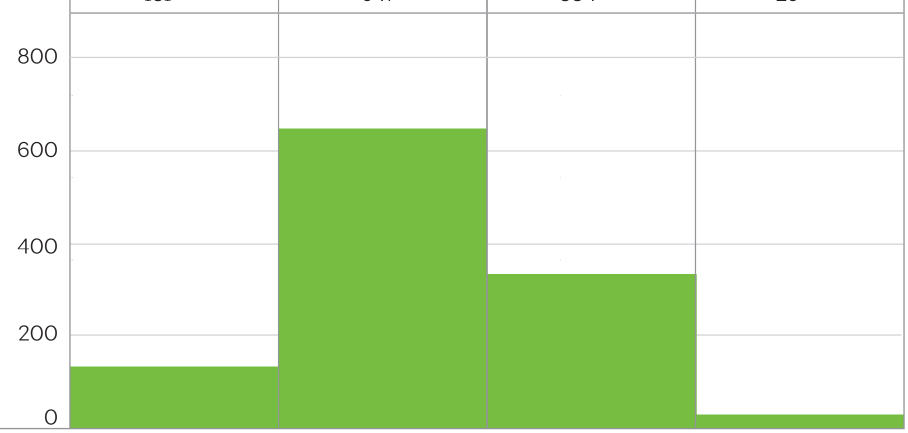
If energy models are defined early in the process, targets and strategies can be refined to meet programmatic goals while hitting predicted energy reduction goals. Architects are uniquely positioned to lead this process toward a more holistic, multidisciplinary, and innovative project. We need to do more early and iterative energy modeling to see the greatest energy savings.

Another point in energy models' favor: They can fortify results for sole practitioners and multinational firms alike. They lay out parameters for what's feasible at a site, how weather and climate affect that site, and how different strategies yield different energy use. A variety of energy modeling platforms are available for architects, engineers, and modeling consultants to employ, and the DDx provides insight on which tools are used most frequently (Figure 9). Using energy models to continue the growth of AIA 2030 Commitment projects makes it possible for a growing share of the built world to support carbon reduction. And this would build on a meaningful share of the world as we know it.

For that to happen, participating firms need to publish their data and should incorporate 2030 goals into the culture of their practice to make energy a key factor in design. Riffling back through the DDx makes such arguments fuller. Energy models make them more legible. Firms need to make models part of each project plan and should make the DDx part of each project review. This might require a look at how we embed these practices in firm culture. If deep dives and swims through scatterplot flow against a firm's culture, consider the 2030 Commitment a channel to help firms learn and foster change.

### FIGURE 9. Modeling tool and responsible party

| Energy Modeling Tool Name | Architecture Team | Design Engineer | Modelling Consultant | Other |
|---|---|---|---|---|
| DOE 2.2 | | 5 | 13 | |
| DOE-2.1E/EnergyPro | 2 | 101 | 13 | 4 |
| DOE-2.1E/VisualDOE | | 1 | 7 | |
| DOE-2.2E/eQuest | 7 | **116** | **177** | 4 |
| DOE-2.2E/GreenBuildingStudio | 2 | 2 | | |
| DOE-2.2E/Other | | 4 | | |
| Ecotect | | | 1 | |
| Energy Plus/Design Builder | 9 | 3 | 3 | |
| Energy Plus/OpenStudio | 3 | 18 | 11 | |
| Energy Plus/other | **22** | 11 | 9 | 1 |
| Green Building Studio/Vasari | 4 | | 1 | |
| HAP | 2 | 41 | 6 | |
| HEED | 1 | | | |
| Home Energy Saver | | 1 | | |
| IES - Virtual environment | 3 | **154** | 37 | |
| None | | 1 | | |
| Other | **28** | 31 | **19** | 15 |
| Other energy simulation tool | 4 | 15 | 15 | 4 |
| REM rate | 6 | | 5 | |
| Sefaira | **38** | 5 | 1 | 1 |
| Trace 700 | | **138** | 16 | |
| Grand total number of projects | 131 | 647 | 334 | 29 |




Note: Top 3 most used tools are shown in bold.

**FIGURE 7. Percent total whole building GSF modeled vs. non-modeled and pEUI percent reduction**

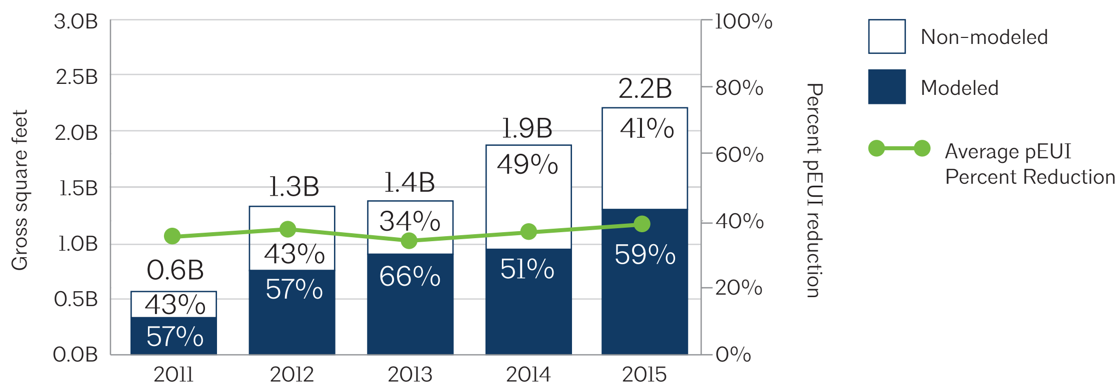
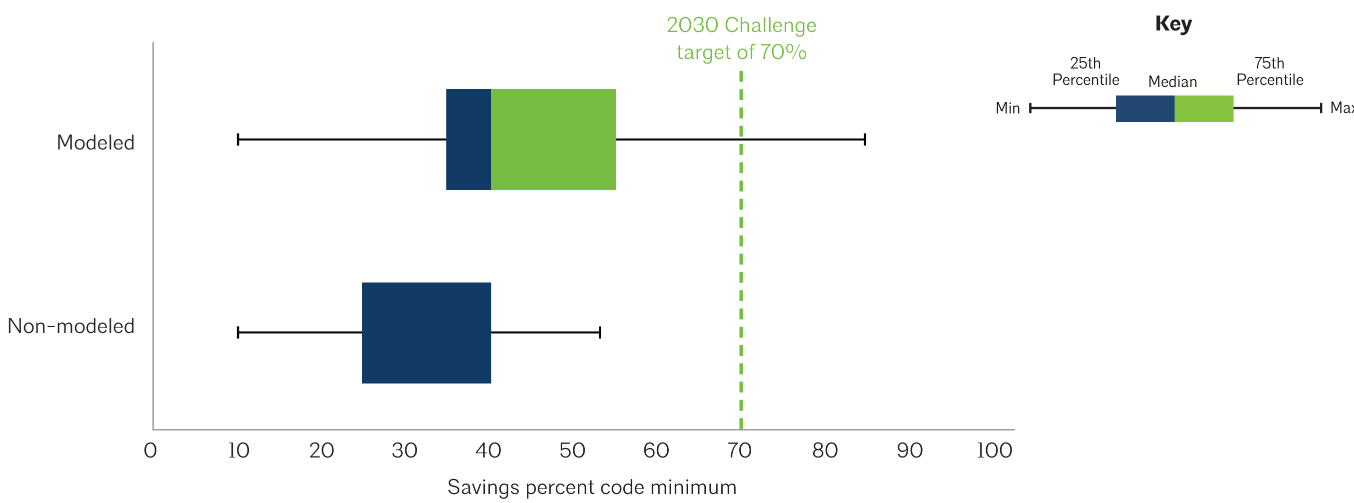



**FIGURE 8. Box chart—modeled vs. non-modeled**



## SmithgroupJJR

Greg Mella, FAIA, an architect with SmithGroupJJR, and co-chair of the AIA 2030 Commitment Working Group, sees the DDx as a furnace for detailed energy models. For Mella, who's been helping lead the 2030 Commitment since it started, data can help shatter the misconception that lower pEUIs predict higher costs with lower returns. "In the first year we organized lunchtime case studies, and a lot of the discussion revolved around debunking the myth that you needed a philanthropic client to meet the energy targets," he says. In fact, projects that use less energy incur lower costs and attract more ambitious, progressive occupants. But the energy savings need to prove out over time for the business case to emerge.

**"We know how to get to these 2030 targets—it's about ensuring that every project begins with an energy target, and energy modeling is used early as a tool to inform design."** —Greg Mella, FAIA

Energy modeling entered firms' discussions more consistently as architects, engineers, owners, and consultants reckoned ways to report a path to reduced energy use intensity. "We were able to make a business case for bringing modeling in-house," says Mella. "We know how to get to these 2030 targets—it's about ensuring that every project begins with an energy target, and energy modeling is used early as a tool to inform design."

The DDx makes that business case more attainable in part because it sets up comparisons between any number of specific projects. Even a firm like SmithGroupJJR, which has spent many years building and using energy models, has had limited ability to track results across specific design choices or circumstances. "We were always comparing ourselves against rolled-up data," says Mella.

Energy modeling provides the clearest value when architects own it, rather than contract it out to a consultant. As Mella explains, bringing modeling in-house obviates questions about how the costs of a consultant affect fees. It also brings architects to the steering wheel on choices that affect how their buildings work and how we measure their effect.

## Payette

The energy model charts a map to the target. A model, explains Andrea Love, AIA, of the Boston firm Payette, is a description of a site. The model includes historical patterns of weather, human behavior, energy bills, and local codes, with data about materials and other design choices. With patient humans accumulating details and software crunching predictions, these models show how much energy tends to flow from a particular design. But without a model, even the most patient humans stand little chance of reliably dialing down future energy use. Nearly half the non-modeled projects in our Report predicted lower carbon savings than the baseline, That's too many projects providing energy the same old way in a dangerous new world.

Love illustrates a way to meet the Commitment by describing how energy models can make good energy strategy. A university project in Boston, she says, ended up with a double-skin façade because the energy model showed that cooling used much more energy than heating. The resulting project predicted lower energy use intensity through the passive strategy of double-skinning—and the firm moved closer to its goals.

## Lake|Flato

Energy modeling can reveal oversights in planning, but it can also turn up opportunities. "Before models we had been relying on our intuition—and we've learned that intuition isn't always right," says Heather Gayle Holdridge, EIT, Assoc. AIA, an energy-modeling specialist with Lake|Flato in San Antonio, Texas, who sits on the AIA 2030 Commitment Working Group.

"We have climate data in early analysis, before pencil and paper," says Holdridge. "A good energy model has impact at the beginning, even if at that point not a lot goes into it. I tell the team we can use basic facts: where is it in terms of ZIP code, what kind of program does it have, and roughly what's the square footage. The model tells me where my biggest inputs are. Then we can solve a problem: How much do adjustments in size and shape reduce energy consumption?"

Models can show that public buildings in New England waste more on heat than on cooling, or that sites in the desert get cold at night. With the facts they array, models give architects a baseline for energy output from a specific design. That baseline can become a jumping-off point as architects achieve the same or deeper comfort, and the same or sharper looks, with less wasted energy. "I've built thousands of energy models, and I'm always surprised," says Holdridge.

**"Before models we had been relying on our intuition—and we've learned that intuition isn't always right"**
—Heather Gayle Holdridge, EIT, Assoc. AIA

# It adds up: aggregate impact

The AIA 2030 Commitment is making an impact. Cumulatively, the energy saved from 2015 projects is approximately 21 million metric tons of greenhouse gas emissions, the equivalent of running six coal-fired power plants or powering 2.2 million homes in a year (EPA Greenhouse Gas Equivalencies Calculator). Since most energy production emits carbon (EPA, 2016), and since we need to switch our economy to low-carbon fuels, predictions in the Commitment make projects into beacons for the future.

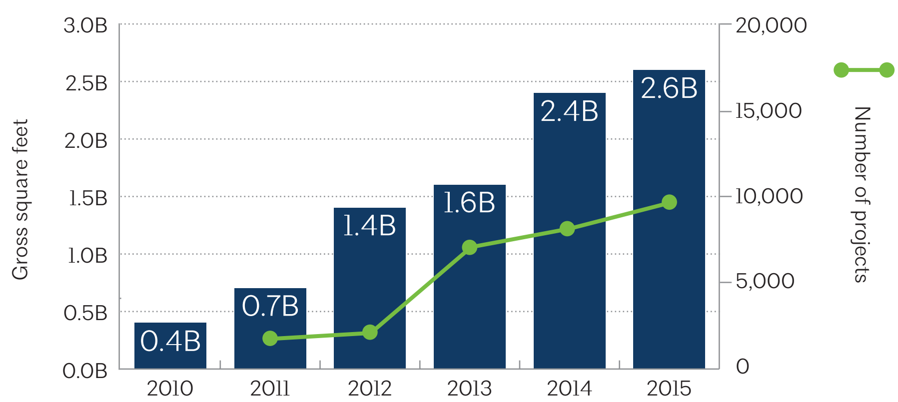
Over the Commitment's first six years, the total project area has grown more than six times over. It now covers 2.6 billion square feet worldwide, up 8.3 percent from the previous year (Figure 10). Increasingly, these projects are the schools, hospitals, airports, offices, and homes that we use every day.

### The World is changing faster than ever

At a moment when more speed and greater scale are required, the AIA welcomes an uptick in the number of projects coming from outside the United States. In 2015 it received reports from projects in 76 countries, 25 more countries than submitted in 2014 (Figure 11). International modeled projects performed particularly well, with an average of 47.7 percent predicted energy savings (See Figure 12). As these projects come into focus, data about ways to reach the 2030 Commitment are coming from all over the world.

The number of projects in the pipeline meeting the 60 percent reduction target reached 614, a 49 percent climb from 2014—more than any other reporting year

**FIGURE 10. Total reported area (GSF) and total number of projects**




Data for total number of projects is unavailable for 2010.

**FIGURE 11. Reach of international participation**

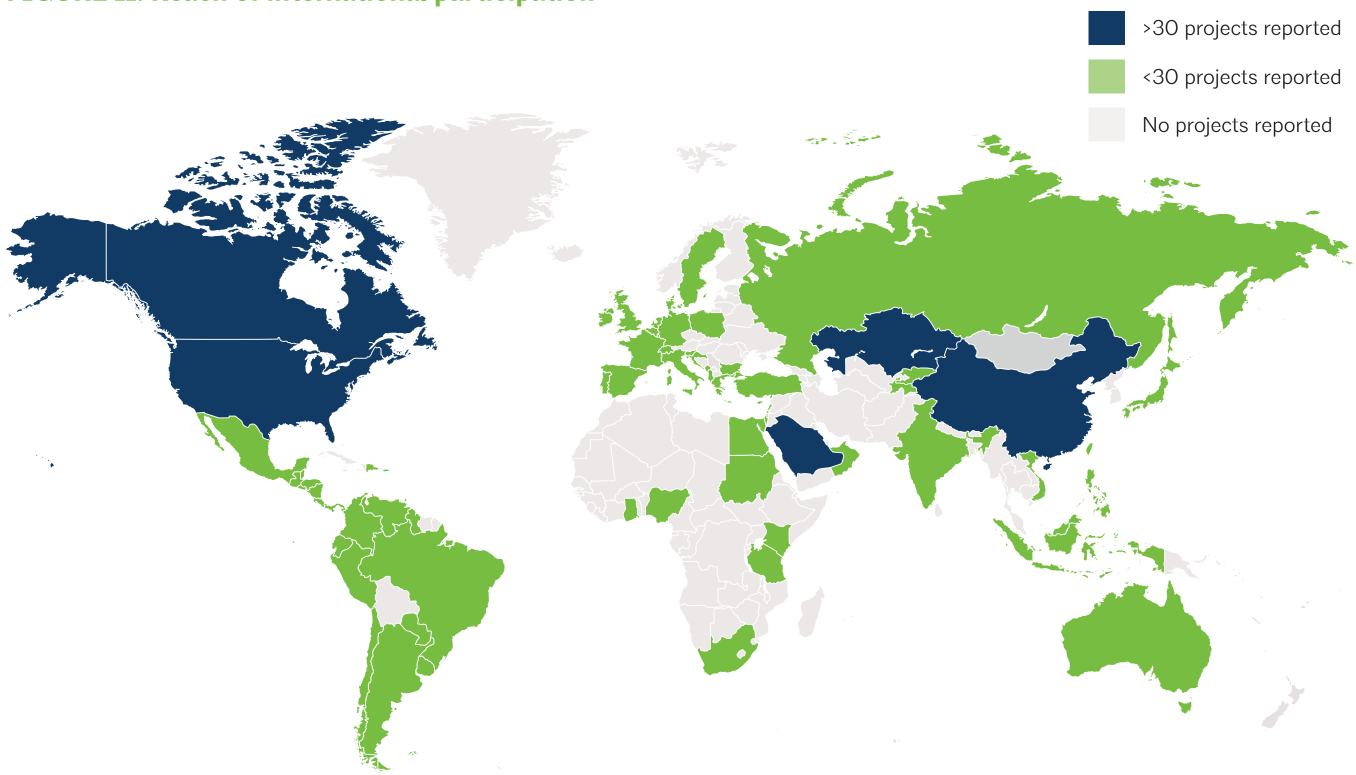
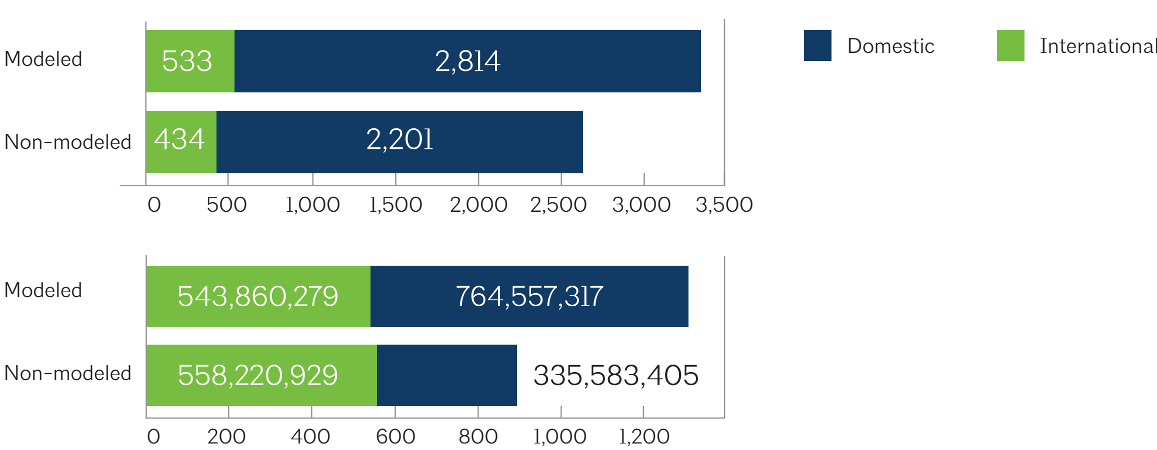



**FIGURE 12. Domestic vs. international impact and performance**




| | International | Domestic |
|---|---|---|
| Modeled | 47.7% Average pEUI reduction | 41.1% Average pEUI reduction |
| Non-modeled | 25.2% Average pEUI reduction | 36.9% Average pEUI reduction |

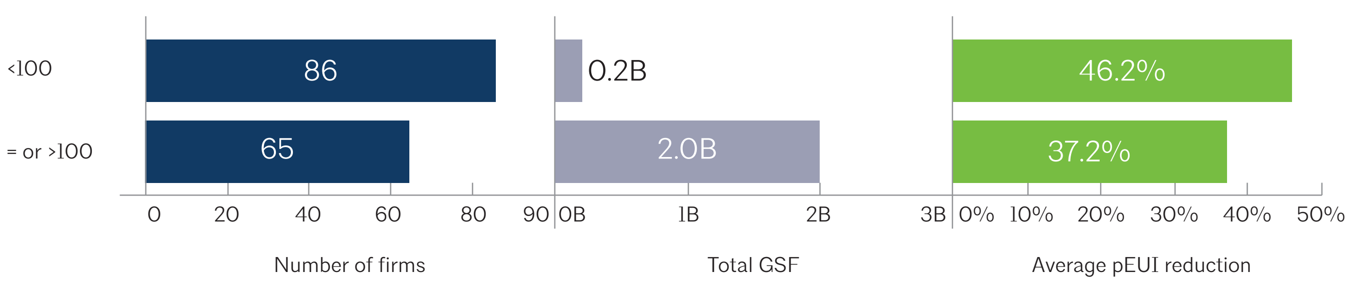
but actually 4 points less as a percentage of the overall GSF. While it's gratifying that a greater percent of the projects are meeting the targets, it's encouraging to see a continued rapid increase in the overall number of projects and GSF reporting. It's also worth noting that while the number of projects and overall GSF contributed by small-to-mid-size firms is outweighed by the larger firms, these small-to-mid-sized firms have better-than-average performing projects (Figure13). Our portfolio continues to grow rapidly and includes a more accurate picture of projects, not just the highest-achieving. Because we learn more from a bigger data set, we can rally faster and more forcefully to make the changes the Commitment requires in its 14 remaining years.

Domestically we see California, Texas, Illinois, Massachusetts, and Michigan as the top five states by number of whole building projects. State energy code is one of the biggest drivers of the average pEUI, and state-level averages reveal the stringent adopters and those with code lags (Figure 14). The DDx allows much more granular levels of information to be analyzed but can only go as deep as the breadth and number of projects. For example, 24 of the states and U.S. territories did not have enough projects to make the state-level data statistically significant. Moving forward with continued growth of data will only make our perspective more clear.

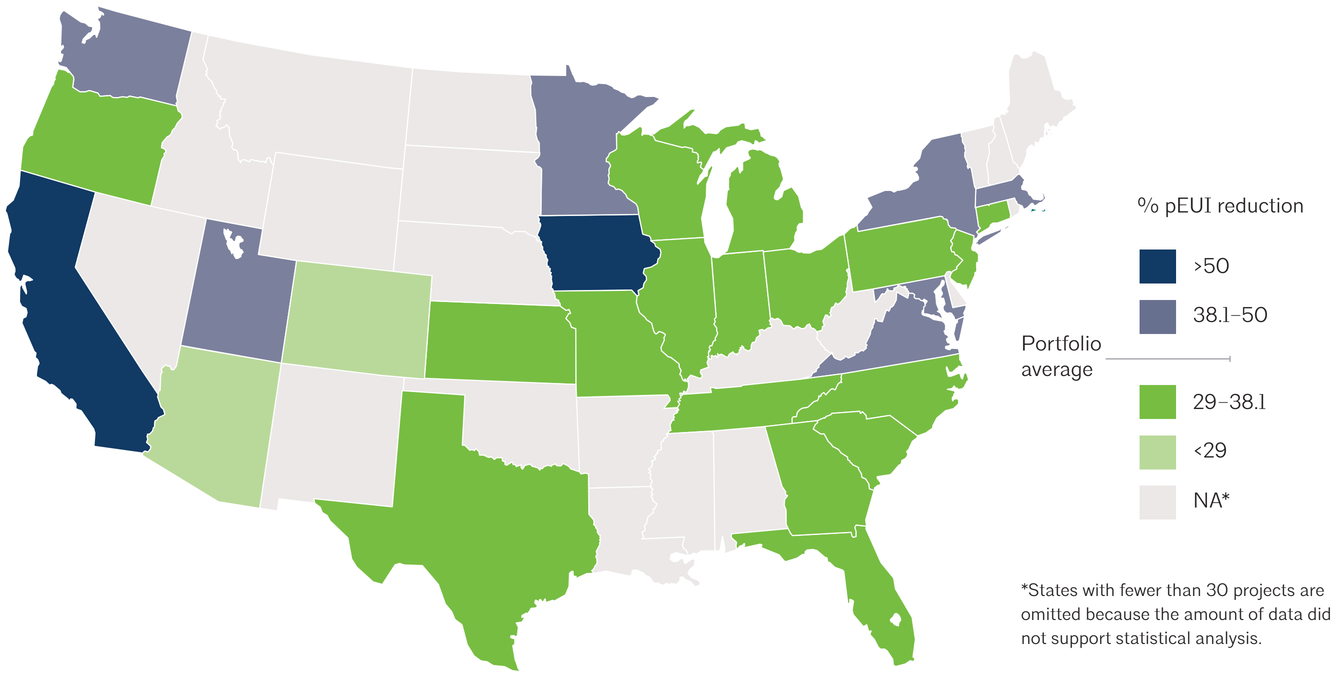
On the use type scale, single-family homes showed a 46 percent pEUI savings reduction on a weighted average of GSF—higher than most other use types, and visible to neighbors and postal workers and children with special immediacy (See Figure 15). That's the gratifying news, as the benchmark rises to 70 percent savings in pEUI. The mandate to think harder and share more comes from the overall numbers.

But progress describes a squiggly line, with special challenges cropping up in each use type. On interiors-only work, K-12 educations predicted savings lower than 5 percent and retail looked most promising (Figure 16). The devil is in the details, but the remedy of design flows from the data. Robust data and specific comparisons will continue to make the DDx data a valuable resource.

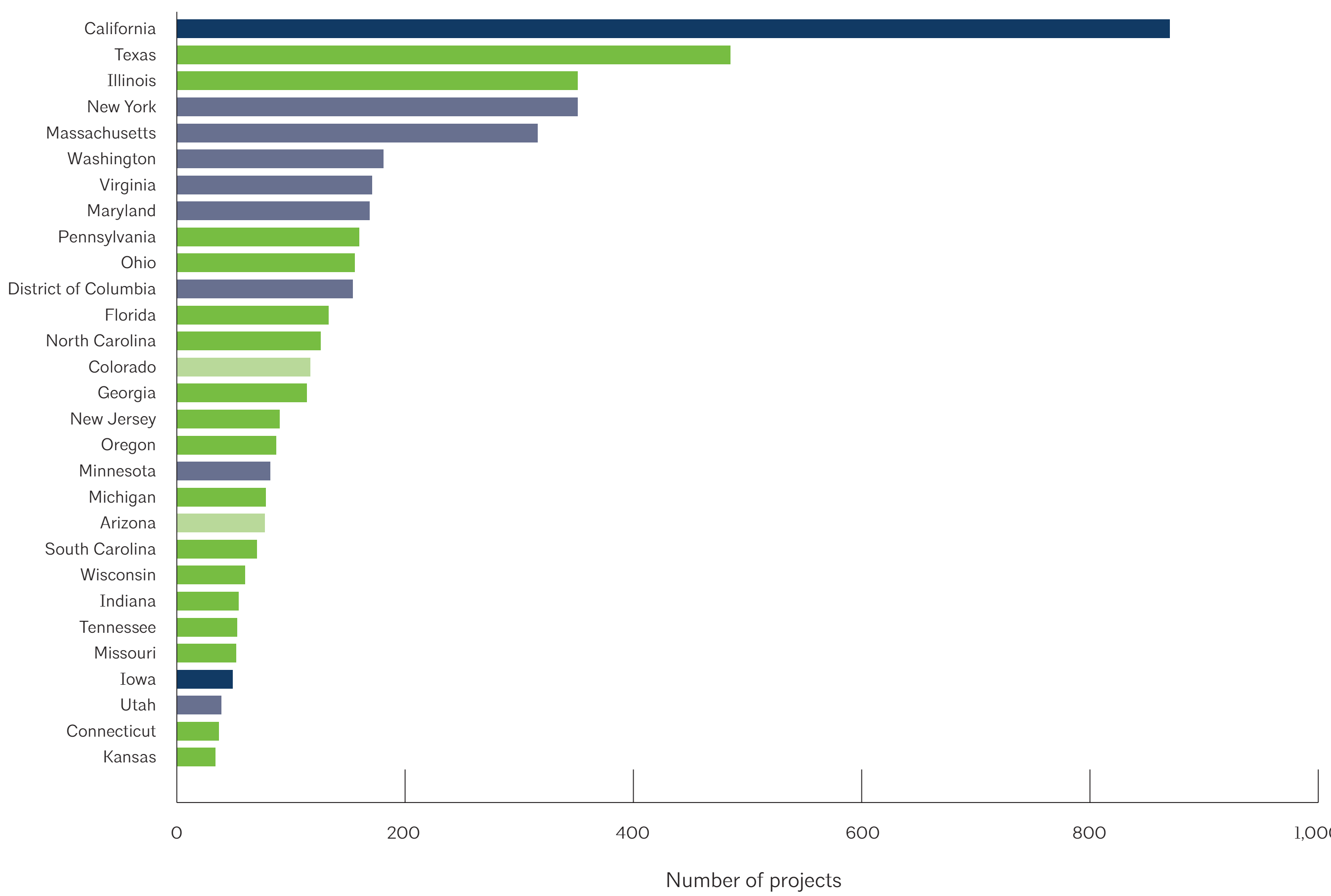
**FIGURE 13. Firm size and performance**



## FIGURE 14. Average pEUI reduction in the U.S.




*States with fewer than 30 projects are omitted because the amount of data did not support statistical analysis.



### Figure 15. Whole building projects by use type

| Use type | Average pEUI reduction | Number of projects | Total GSF (million) | Average GSF | Average EUI* |
|---|---|---|---|---|---|
| Assembly | 40.8 | 530 | 93.3 | 176,011 | 52 |
| Higher education | 40.7 | 428 | 47.0 | 109,857 | 82 |
| K-12 education | 43.7 | 413 | 32.3 | 78,268 | 45 |
| Laboratory | 46.3 | 198 | 25.5 | 128,712 | 201 |
| Healthcare | 38.1 | 606 | 131.0 | 216,222 | 125 |
| Office | 42.1 | 1,076 | 455.2 | 423,012 | 60 |
| Retail | 32.8 | 650 | 379.0 | 583,014 | 75 |
| Multi-family residential | 41.8 | 640 | 204.5 | 319,554 | 42 |
| Single-family residential | 46.4 | 155 | 1.5 | 9,348 | 26 |
| Mixed Use | 35.8 | 679 | 619.4 | 912,261 | 61 |
| Other | 38.3 | 607 | 213.6 | 351,842 | 103 |

### FIGURE 16. Interiors projects by use type

| Use Type | Average pEUI reduction | Number of projects | Total GSF (million) | Average GSF |
|---|---|---|---|---|
| Assembly | 28.2 | 67 | 3.1 | 45,545 |
| Higher education | 27.3 | 79 | 2.2 | 27,456 |
| K-12 education | 2.3 | 63 | 10.7 | 169,111 |
| Laboratory | 19.0 | 96 | 1.7 | 17,802 |
| Healthcare | 25.5 | 433 | 8.8 | 20,328 |
| Office | 28.1 | 800 | 40.5 | 50,666 |
| Retail | 35.3 | 142 | 2.0 | 14,097 |
| Mixed use | 30.9 | 39 | 3.4 | 87,693 |
| Other | 18.1 | 58 | 2.5 | 43,123 |

Note: States with fewer than 30 projects are omitted because the amount of data did not support statistical analysis.

# We're all learning

Honest effort has yet to play out in measurable success. We're looking at relatively flatlined pEUI savings since the Commitment began. That's where firms need to think about collaboration on new terms. As more firms master the building of energy models and the vocabulary of energy savings measures, they can more forcefully attack emissions with many techniques.

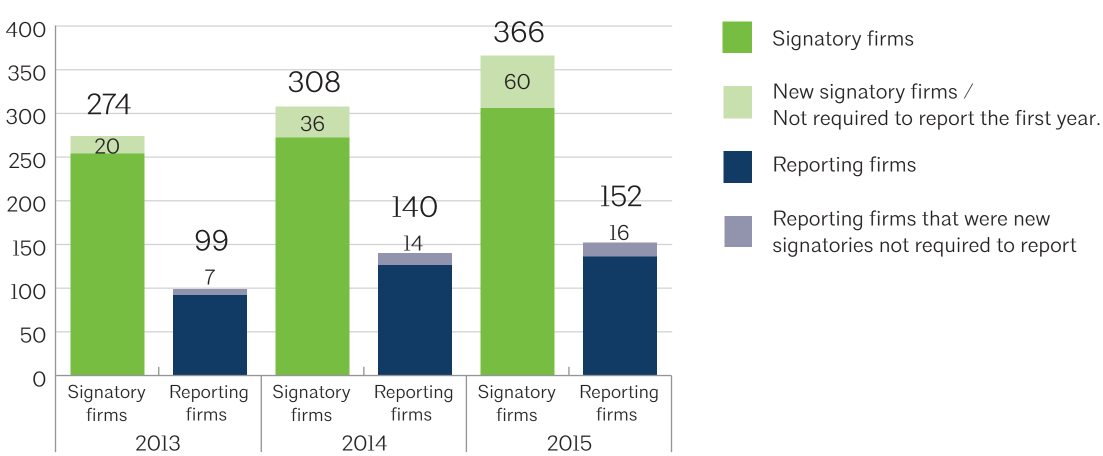
Getting to 70 percent reductions in pEUI demands creativity both in what we design and how early we bring energy considerations and iterative design into the process.

This is the first year of the DDx and it has produced more data than ever before to work with. The AIA has received some really great feedback about project input metrics, the research capabilities, and comparison tools, and the Institute is excited to continue to improve their usefulness and value to the design process.

Comparisons and variables make for solid analysis, but the evidence of over 150 firms reporting provides internal encouragement. And encouragement matters, because sharpening firms' ability to design and deliver projects at lower pEUI means hard and often uncertain work.

"We're getting there," says Mella. For a new and arguably parallel skill, modeling is catching on among firms in the Commitment. The program continues to grow at an ever-increasing rate. In 2015 there were a total of 366 signatories, an 8.6 percent increase from 2014 (Figure 17). Of these 366 signatories, 152 issued reports, and 143 did at least some modeling. But only about half of signatories reported, and barely more than half of the GSF in the portfolio resulted from energy models. Firms can and do use the 2030 Commitment as an opportunity for culture shift toward benchmarking and iterative analysis.

**FIGURE 17. Signatory & reporting firms**



## Turning the 2030 commitment inside out

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. This year's LPD reduction painted a complicated picture. The LPD percent reduction appeared to drop significantly. However, it appears that the lower improvements were driven by two large firms. All interiors-only data combined equated to 9.7 percent, however by removing those two firms from the database LPD reduction increased to 23.6 percent over the baseline, or 1.3 percentage points higher than 2014. The two removed firms imported their data through a prototype bulk reporting method. Although data were confirmed with those firms and vetted upon import, it's interesting their performance was well below the rest of the cohort and significantly affected overall program performance. The AIA will continue to look for opportunities to improve data validation and make reporting a fluid part of design practice.

Going forward, it's likely that interiors-only projects can show new ways of achieving efficiency in energy beyond LPD. "We have looked at using occupancy sensors to daylight areas," says Andrea Love, AIA, 2030 Working Group chair. "We're looking at ways to take into account in a simple way the controls that are associated with lighting. We saw our LPD percent savings significantly drop this year, particularly because of the data provided by just a handful of firms." While the AIA is getting more and more projects reported, our bar for meaning is also climbing. The Institute needs widespread takeup of the DDx, because only analyzing the data helps make sure we are asking the right questions.

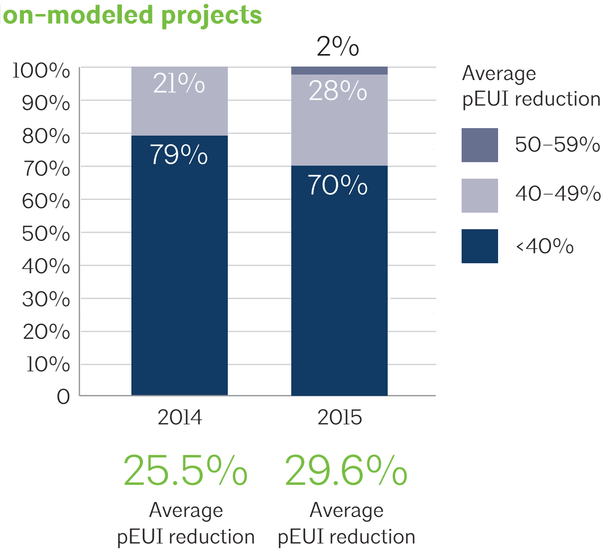
## Propelling improvement

The data provides a more objective take on what architects relearn each day: Change happens gradually as best practices become more familiar. Learning happens iteratively, as firms' results improve from one year to the next.

And energy performance is emerging more fully in the regulatory requirements. pEUI is measured against an average baseline that is explained in the Metrics and Methods section (Appendix 2). But it's important to note that more rigorous codes drove progress in the average predicted energy savings. This partly explains why 30 percent of all non-modeled GSF that firms reported in 2015 predict better than 40 percent savings in pEUI, compared with roughly 20 percent in 2014 (Figure 18). This shows that cities and towns are embracing energy efficiency, which supports the new culture of modeling and energy-driven design we see firms building.

Make no mistake: The AIA needs to help firms change to embrace energy modeling, because the fact that data can set architects on course does not erase the fact that we are running behind. It's sobering to see essentially flat predictive performance in the Commitment's sixth year, especially since the climate is changing faster and more decisively than even scientists had thought (*Scientific American,* 2012). Data-driven design can vault the profession forward, but first it has to catch up hundreds of hardworking firms.

**FIGURE 18. Average pEUI reductions for Non-modeled projects**



# Next steps

The AIA 2030 Commitment will keep gaining signatories, results, and ideas as the target for energy reduction climbs to 100 percent. It will never ask a five-person office to invest in the data-crunching capacity on hand at a multinational firm, and will never prescribe a specific software tool. It will keep feeding and offering the DDx as a resource for ideas, counsel, and objective data about what works and visualizes our progress. And in the same spirit, it will keep guiding firms to think of themselves as designers of sites that are beautiful and function well—and lead humanity away from the stresses of a changed climate.

Communication represents as vital an area for progress as does design. The Working Group is formulating ways to collect updates on what's working, best practices to embed energy design in firm culture, and on tracking project progress. The trick involves getting such insight from reporting firms without overburdening any office that already has a full workload. Reporting should be instructive and not cumbersome, because the AIA 2030 Commitment succeeds to the degree that it encompasses more of the profession.

Gayle Holdridge, EIT, Assoc. AIA, says the 2030 industry collaboration looks likely to spread. "I've already seen a tremendous improvement since the commitment was founded, and I'm sure we'll see that trajectory as the program moves on," she says. "With the launch of the DDx, now we have years of data to draw on and a tool that makes it far easier to organize that data. I'm really looking forward to coming years when we can leverage that tool. We want all offices to be able to offer all clients an energy target, an energy model, and a promise to continuously tighten the fit between low-energy design and valuable design."

For Greg Mella, FAIA, a key turn is when an architect stops thinking of the Commitment as a far horizon and starts construing it as a basic business premise. "The notion of looking at all projects, not just the green ones, is important," he says. "Climate change isn't caused by only a subset of the building industry, and won't be cured by just a handful of great green projects."

Mella likens the change architects must make to one a person pledges when deciding to get in shape. Imagining an end result can lead to discouragement or daydreaming. Plotting out achievable steps—a road race here, a skipped eclair there—builds both results and resolve. And building a community of people who know your grit, your hopes, and your struggle makes it easier to regroup after setbacks. Consistency, fidelity to data, and openness to new methods blaze a trail to success more reliably than any single spectacular performance.

Any firm can, like the ones profiled here, inquire about a project's energy effects in the same initial meeting that sets out design objectives. Any firm can mold design, in color or form or cladding, to fit what a robust energy model says about pEUI. And thanks to the DDx, any firm in the AIA 2030 Commitment can feed what it's learning to a broader pool. More participation makes more evidence and builds more resources. This kind of geometric growth alone addresses the challenge of climate change.

The next few years will show that reducing fossil fuel consumption and maintaining design rigor fit together with increasing closeness. If you have the data and the tools, this is all achievable. Indeed, in an elegant network effect, more firms striving will supply more data which will make more reductions feasible in the future.

But let's sidestep the mistake of equating possibility with guarantee. To do this means we have to learn how to use our resources. A chief resource to mine consists in the human intelligence inside each design team. Another comes from the breadth of experience that the nation's 19,000 firms carry. The DDx can open these resources. It makes benchmarking clearer and richer than it has been for most practitioners to date. It remains for firms to obtain and use the data.

And not a moment too soon.

**"The notion of looking at all projects, not just the green ones, is important… climate change isn't caused by only a subset of the building industry, and won't be cured by just a handful of great green projects."**— Greg Mella, FAIA

## WHAT STEPS CAN YOU TAKE?

1. **If not committed, become committed—there's value in it.**
2. **If committed, double down—more energy modeling.**
3. **At the very least, follow prescriptive paths from more stringent codes.**
4. **Go advocate for stricter energy codes.**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# Appendix 1

### 2015 New signatories

the abo group

Allford Hall Monaghan Morris

Anderson Anderson Architecture

Ankrom Moisan Architects, Inc.

Architectural Nexus

Architerra

BAR Architects

Blair + Mui Dowd Architects

Blank Slate

BLT Architects

Bohlin Cywinski Jackson

Boulder Associates

Bruner/Cott & Associates

Clark Nexsen

COULSON

Croxton Collaborative Architects

David Baker Architects

DEN Architecture

Design Organization

Diamond Schmitt Architects

DiMella Shaffer

eMCee Design

Ennead Architects

Farewell Architects

Fete Nature Architecture

FORMGROUP

green|spaces

Handel Architects

Hastings Architecture Associates, LLC

Henneberry Eddy Architects

HMFH Architects, Inc.

JAHN

Julia Hughes, AIA

Keith Sanders Architecture & Consulting Services

Lucas Sustainable

Lynch Eisinger Design

McGranahan Architects

MDS/Miller Dyer Spears

Moody Nolan

Munn Architecture

NADAAA

PartFour Architects

Paul A. Castrucci, Architect

Paul Murdoch Architects

Pelli Clarke Pelli Architects

RATIO

Richard Pedranti Architect

Robert A.M. Stern Architects

SGA (Spagnolo Gisness & Associates)

Siegel & Strain Architects

Snow Kreilich Architects

SRG Partnership Inc.

Studio Nigro

Substance Architecture

the abo group

Thompson Naylor Architects

Treanor Architects

William McDonough + Partners

## 2015 Signatory firms reporting for the AIA 2030 Commitment

Adrian Smith + Gordon Gill Architecture

Albert Kahn Associates, Inc.

Alliiance

Ankrom Moisan Architects, Inc.

Ann Beha Architects

ARC/Architectural Resources Cambridge, Inc.

archimania

Architekton

Architerra

Atelier Ten

Ayers Saint Gross

Ballinger

BAR Architects

Bard, Rao + Athanas Consulting Engineers LLC

Bergmeyer Associates

BKSK Architects

BLT Architects

BNIM

Bora Architects

Braun & Steidl Architects

Bruner/Cott & Associates

BuroHappold Engineering

BWBR

CallisonRTKL

CannonDesign

CBT Architects

Coldham & Hartman Architects

Cooper Carry

COULSON

Cuningham Group Architecture

Cunningham | Quill Architects

Dattner Architects

David Baker Architects

Davis Partnership Architects

Design Organization

Dewberry

DiMella Shaffer

DLR Group

Dore & Whittier Architects

DWL Architects + Planners, Inc.

Ehdd

Ehrlich Architects

Ellenzweig

Engberg Anderson Architects

English + Associates Architects, Inc.

Ennead Architects

Epstein

Eskew+Dumez+Ripple

EwingCole

Farr Associates

FXFOWLE Architects

Garth Shaw

Gensler

GGLO

gkkworks

Goettsch Partners

Goody Clancy

green|spaces

Gresham, Smith and Partners

Guidon Design

GWWO Inc. Architects

Hacker

Hahnfeld Hoffer Stanford

Harley Ellis Devereaux

HarrisonKornberg Architects

HPA (Hartshorne Plunkard Architecture)

Hastings Architecture Associates, LLC

HDR

High Plains Architects

HKS

HMC Architects

HOK

Hord Coplan Macht

IKM Incorporated

In Balance Green Consulting

Jacobs Global Buildings Design

JAHN

Jer Greene, AIA + CPHC

Jones Design Studio

Jones Studio

Kipnis Architecture + Planning

kmd Architects

L.M. Holder III, FAIA

Lake|Flato Architects

Landon Bone Baker Architects

Leddy Maytum Stacy Architects

Leers Weinzapfel Associates

Legat Architects

Lehrer Architects LA, Inc.

Little Diversified Architectural Consulting

LMN Architects

Lord Aeck Sargent

LPA, Inc.

LS3P

Mahlum Architects

Mazzetti

McGranahan Architects

MDS|Miller Dyer Spears, Inc.

Mithūn

Moody Nolan

Moseley Architects

MSR

NBBJ

OPN Architects

Opsis Architecture

Orcutt | Winslow

Overland Partners

Paul Poirier + Associates Architects

Payette

Pei Cobb Freed & Partners Architects LLP

Pelli Clarke Pelli Architects

Perkins+Will

Perkins Eastman

Pickard Chilton

PositivEnergy Practice

QKA (Quattrocchi Kwok Architects)

Quinn Evans Architects

RB+B Architects, Inc.

Robert A. M. Stern Architects

Ross Barney Architects

RVK Architects, Inc.

Sasaki Associates

Schmidt Associates

SERA Architects

Serena Sturm Architects

SHP Leading Design

Smith Seckman Reid, Inc.

SmithGroupJJR

SMMA

SCB (Solomon Cordwell Buenz)

SOM (Skidmore Owings & Merrill)

Steffian Bradley Architects

STUDIOS architecture

The Beck Group

The Miller Hull Partnership

The Sheward Partnership

The S/L/A/M Collaborative

Treanor Architects

Tsoi/Kobus & Associates

Valerio Dewalt Train Associates

Vanderweil Engineers

WBRC Architects/Engineers

Weber Thompson

Westlake Reed Leskosky

Wight & Company

William Rawn Associates

Willoughby Engineering

Wilson Architects

WLC Architects, Inc.

WRNS Studio

Yost Grube Hall Architecture

ZeroEnergy Design

ZGF Architects LLP

# Appendix 2

## Metrics and methods

AIA 2030 Commitment measures project forecasts against baseline: metered energy use intensity (EUI) derived from the 2003 Commercial Building Energy Consumption Survey (CBECS) and the 2001 Residential Energy Consumption Survey. Both surveys come from the Energy Information Administration (EIA) and include a representative sampling of U.S. building stock.

The metric we use, EUI, reports a building's energy use per unit area in thousands of British thermal units per gross square footage (GSF) per year (kBtu/GSF/yr). The 2003 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. Predicted energy use intensity (pEUI) is measured in kBtu/GSF/year based on modeled attributes and assumptions.

The project pEUI is determined either through energy modeling or using code equivalent projections. All whole-building projects require selection of a design energy code. For non-modeled projects, the selected code determines a saving percent reduction that is a calculated value of the savings percent above or below the 2003 CBECS averages. This approach uses estimates of code comparisons based on analyses by Pacific Northwest National Laboratory, New Buildings Institute, and Architecture 2030. When a project has energy modeling data, the pEUI is established by the energy model. However, if the modeled pEUI calculates a percent savings that is less than design code equivalent savings, the code equivalent is used for the predicted savings. Modeled projects can show pEUI below the baseline for a number of reasons; however, it is assumed those projects are meeting code requirements, thus achieving the code equivalent.

Bear in mind reporting is based on site EUI, which measures the energy used at the building site, as opposed to source EUI. Source energy reflects what's used not only at the building level but also for electricity generation, transmission, and 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) for the design work of AIA member firms.

Just as models come out differently in each job, pEUI calculations vary across sites. For each whole-building project, we subtract the percentage reduction of pEUI from the baseline average EUI and multiply that number by the project's 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. This emphasizes the importance of project size, as larger projects within a firm's portfolio have a larger impact on carbon. Because the DDx provides greater opportunity to slice the data from various angles, moving forward we will be able to provide increasing granularity so that firms and projects of all sizes can gain valuable insights from data trends. In the context of increasingly stringent codes and Commitment requirements, this power of data analysis and tracking should encourage more experimentation and robust but anonymous data-sharing.

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 exclude HVAC system or envelope modifications, LPD is the criterion most applicable to interiors-only projects. The LPD metric is the sum of wattage required for all lighting equipment (as calculated per ASHRAE [American Society of Heating, Refrigerating, and Air Conditioning Engineers] methodologies) divided by project area. The wattage (W) in the W/sf 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 and is seldom employed for interiors-only projects.

**The 2003 CBECS serves as the widely adopted baseline EUI for measuring operational energy use and reductions.**

On this score, we set our benchmark based on ASHRAE 90.1-2007. In this standard, installed interior LPD includes all power used by luminaires, with a number of exceptions—including essential display and 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.

## List of tables & figures



## Resources


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