The Importance of Building Energy Codes

How to Engage the Architectural Community

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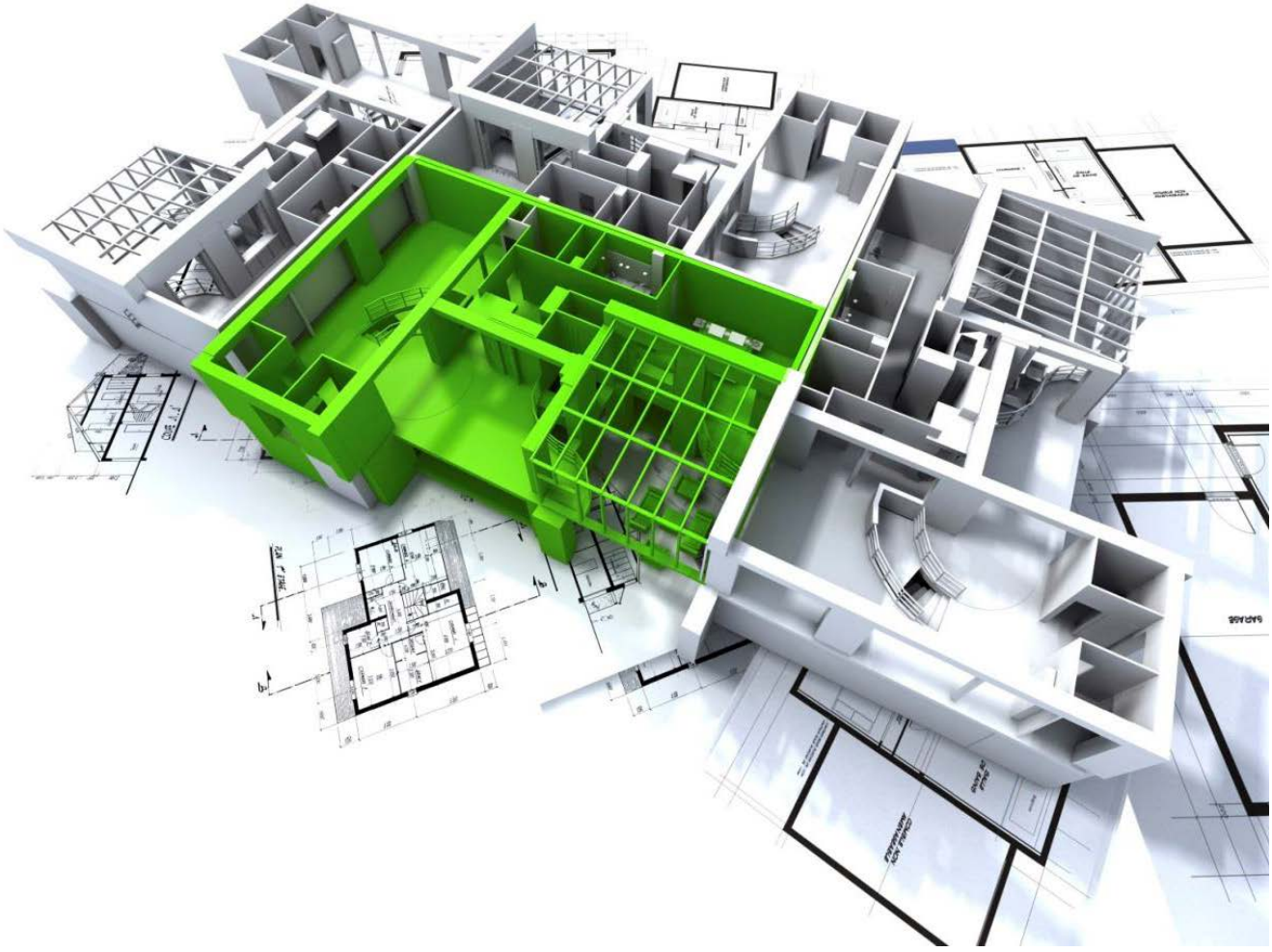

BCAP

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OBJECTIVES

This goal of this report is to identify ways to rally the architecture community in support of the building energy code by analyzing the challenges and opportunities that the energy code presents to the profession. The ensuing sections will:

- Summarize the importance of building energy code compliance
- Describe the challenges that architects face
- Explain why architects should care about the effectiveness of the energy code
- Identify potential threats and opportunities associated with energy codes and energy performance
- Explore outreach strategies and resources to engage architects

BACKGROUND

In the United States, the operation of buildings accounts for more than 40 percent of energy consumption, while construction and building materials account for an additional 6 percent.[1] Buildings are evidently a vital source for reductions in the nation's energy consumption, and over the last four decades building codes have emerged as a necessary tool toward achieving that goal. Building energy codes mandate design and construction practices, materials, equipment, and systems that are intended to achieve minimum efficiency targets when buildings are initially constructed as well as when renovated. However, the process by which these codes are implemented and enforced makes it difficult to ensure that the efficiency targets are actually met. From the number of stakeholders involved in each building project to the fragmented nature of local enforcement, there are many potential gaps in the code application process.

In 2009, focus on the energy code increased dramatically due to the stipulation in the American Recovery and Reinvestment and Act that states had to develop a plan to achieve 90 percent compliance with their updated building energy code(s) by 2017 in order to receive funding. As the plans were developed, it was clear that a heavy emphasis had to be placed on the adoption of the current model energy code – the 2009 International Energy Conservation Code (IECC). After significant gains in energy code adoption, the focus has now shifted to meeting the compliance goal. As shown in numerous compliance studies, including DOE's pilot state's compliance evaluations, adoption has not necessarily ensured proper implementation of the code.[2] As a result, buildings are not performing as efficiently as they should. A good deal of emphasis has been placed on the enforcement of the energy code, and many initiatives like the Building Codes Assistance Project's (BCAP) Energy Code Ambassadors Program are geared toward supporting code officials. While enforcement remains an important part of ensuring energy code compliance, the implementation of the code is equally if not more important.

[1] Architecture 2030. (2011). "Problem: The Building Sector." Retrieved from http://architecture2030.org/the_problem/problem_energy
[2] U.S. Department of Energy. 90% Compliance Pilot Studies: Final Report. 2013. Retrieved from http://www1.eere.energy.gov/buildings/pdfs/compliance_pilot_studies_final_report.pdf

In a survey distributed by the American Institute of Architects (AIA) to its membership, 75 percent of respondents identified architects as the party primarily responsible for code compliance. However, the same survey also revealed an alarming lack of awareness, understanding, and involvement in the building code development process. Though they are responsible for code compliance, architects are surprisingly passive in code development. According to the survey, the level of knowledge and the effort put into code review and compliance were directly related to the version of the codes and how they were enforced, This revelation, combined with the lack of engagement in code development, suggests that building codes are addressed by architects as needed but not prioritized.

WHY SHOULD ARCHITECTS CARE?

Architects bear tremendous responsibility in the development of our built environment; they are tasked with delivering safety, functionality, and artistry in their designs. Increased awareness of the environmental impact of buildings has broadened the responsibilities of architects. The AIA's 2030 Commitment – which calls for buildings to be carbon neutral by 2030 – reinforces the profession's dedication to energy efficiency and sustainable design. Architecture 2030 specifically highlights energy codes as a means for meeting the goals of the 2030 Challenge. However, achieving 100 percent compliance with the current energy code isn't enough because the codes are not meeting the pace set by the 2030 Challenge milestones (**Figure 1**). Architects need to become more active in supporting more effective energy codes.

Table A: 2030 Challenge Interim Code Equivalents

CODE / STANDARD	COMMERCIAL	RESIDENTIAL
ASHRAE 90.1-2004	30% below	
ASHRAE 90.1-2007	25% below	
ASHRAE 189 (in progress)	0	
IECC 2006	30% below	30% below
California Title 24 2005		15% - 20% below[13]
California Title 24 2008	10% below[14]	
Oregon Energy Code[15]	25% below	30% below
Washington Energy Code	25% below	25% - 30% below[16]
RESNET HERS Index		65 or less
LEED NC 2.2 / Homes	New - EA Credit #1: 6 pts Renovation - EA Credit #1: 8pts	HERS Index: 65
LEED 2009 (in progress)	New - EA Credit #1: 7 pts Renovation - EA Credit #1: 9pts	
GBI Standard (in progress)[17]	PATH A, 8.1.1.1: 150pts	
EECC Option[18] (prescriptive path)		EC - 154
NBI Option[19] (prescriptive path)	New - Core Performance w/ enhanced measures	

Figure 1: 2030 Challenge Interim Code Equivalents[3]

Unfortunately, owners, not architects make the final decision on designs, which makes it difficult for them to ensure energy efficiency. Building energy codes are one way in which architects can assume greater control over the impact of the buildings they design. Code compliance is a mandatory requirement for buildings; architects have the opportunity to increase their influence by using the energy code to take ownership of building performance. The performance compliance path allows design to become a crucial component in implementing the code.

The evolution of the energy code clearly shows that energy efficiency and building performance is an increasingly important issue (**Figure 2**). However, this growth is not only a trend in building policy; the market for sustainable buildings is growing worldwide. Much of the market demand is associated with certifications, such as LEED or EnergyStar (**Figure 3**), however, the lower operating costs realized through energy code compliance should also be an important issue for clients. As client

[3] Architecture 2030. Meeting the 2030 Challenge through Building Codes. 2008

awareness continues to grow, so does the available data. More and more major cities are passing policies on energy disclosure and benchmarking which makes a building's performance public information. This information combined with the market's growing demand for energy efficiency, will increase the accountability of design professionals in the building industry. Though there are many factors that impact building performance, effective implementation of the energy code is an important step in meeting performance goals. A proactive approach to energy code compliance and building performance could be a means for architects to expand their presence in the market.

When adopted, the energy code offers architects a way to increase their influence in the decision making process by aligning with the goals and financial incentives of clients in a way that other building codes do not. That is why it is important for architects to become actively engaged in making the energy code more effective.

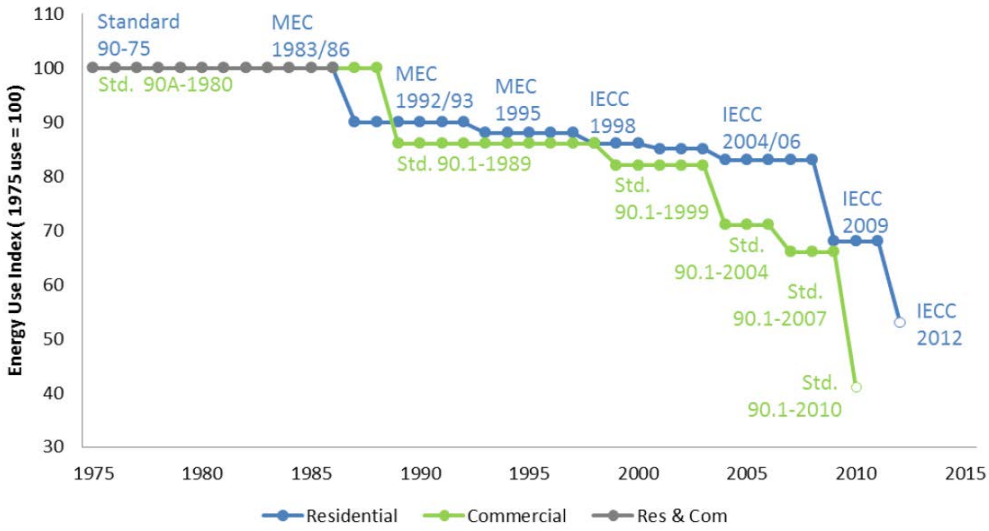

Figure 2: Efficiency Gains in Residential and Commercial Model Energy Code Editions (Source: ACEEE)

Study	Rental Premium	Sales Price Premium	Vacancy Rate Premium
Fuerst & McAllister (2011)[12]	Energy Star 4 %	Energy Star 26 %	Energy Star 1-3 %
	LEED 5 %[13]	LEED 25 %	LEED: No Premium
Eichholtz et al (AER)[14]	Energy Star 3.3 %	Energy Star 19 %	Bundled as "effective rent": 7 % premium overall
	LEED: 5.2 %[15]	LEED: 11 %[15]	15%
Eichholtz et al (RICS)[16]	Energy Star: 2.1 %	Energy Star 13 %	Bundled as "effective rent": 6-7 % premium overall
	LEED 5.8 %	LEED 11 %	
Pivo & Fisher[17]	2.70%	8.50%	Not Addressed
Wiley et al (2010)[18]	Energy Star 7-9 %	Not Addressed	Energy Star: 10-11 %
	LEED 15-17 %	LEED: 16-18 %	
Miller et. al. (2008)[19]	9%	None	2-4 %

Figure 3: U.S. Green Office Value Studies[4]

Challenges & Recommendations

The following section looks at the challenges that make energy code implementation and compliance difficult for architects, and presents ways to address them. It will also identify the threats and opportunities associated with some of these challenges.

Overburdened by Building Codes

Challenge: Much like the issues faced by code enforcement departments, a shortage of resources and trained staff plays a role in a firm's ability to adequately address building codes. The number of codes – as many as 16 different codes and standards – that may be adopted in different localities can also overburden architects, which could partially explain the lack of engagement in the code development process. Architects have also cited inconsistencies and a lack of clarity in the way the codes are written. These issues make it even more difficult to rally the architecture community to support the energy code.

Recommendation: Architects are responsible for code compliance, and it would be logical for the codes to be written in a manner that is facilitates their implementation of the code. The lack of architect input in the code development process means that their concerns go unheard and unaddressed. Increased engagement by architects is an important step in addressing these issues and easing the burden that many architects feel with building codes. Initiatives by local AIA chapters to increase attendance at code hearings would help to make their concerns known and move toward a resolution.

Misalignment of Incentives

Challenge: One barrier that may pose an even greater challenge to code compliance is a misalignment of incentives between architects and their clients. Architects are legally required to comply with codes but their success is determined by

[4] Watson, Rob. Green Building Market & Impact Report. 2011

their ability to meet the demands of their clients. For most owners and developers, the incentives are economic and they are primarily concerned with costs and potential revenue. Codes are outside the scope of an owner's responsibilities, and they are not perceived to deliver any significant economic value to a project. Therefore, architects are more inclined to focus their efforts in activities that are valued by their clients. This also helps to explain the lack of interest that many architects seem to have in building codes.

As stated earlier, architects can utilize a mandatory energy code to expand their decision making abilities in the design process. In practice, however, architects have numerous responsibilities with higher priority because those responsibilities have an immediate impact on a firm's success.

Recommendation: It is important for architects to become adept at communicating with clients in a manner that addresses the client's needs and demands. The fact that the energy code is required and it has a measurable financial impact makes it the perfect tool for architects to present design strategies to clients. Though this may assist in increasing design control, architects need to understand how to develop energy efficient designs through the use of energy modeling and other tools. For design to directly impact energy performance on a consistent basis, it is also important to find ways to integrate codes into the design process to make them easier to implement.

Codes Overlooked

The building energy code seemingly could address some of the incentive issues, but its perception amongst the stakeholders involved prevents it from doing so. The requirements of the IECC are designed to reduce energy use and therefore reduce building operating costs. However, those benefits are overlooked by clients because they assume that the code is being properly applied. This leads to the notion that certifications and retrofits are the only ways to improve energy efficiency. Those are excellent solutions but they can be cost prohibitive for smaller clients.

Recommendation: Educating owners about the benefits of considering code issues when performing renovations could help some architecture firms differentiate themselves with smaller clients. For those who find certifications cost prohibitive, strategic application of energy code provisions could yield benefits that otherwise would have been ignored. With high levels of non-compliance and more information being made available, there is an opportunity for architects to show that they can deliver significant savings through code compliance at a modest cost.

Threats to the Architects

The evolving real estate and policy markets have already proven to be a significant test to the architectural profession; and firms that evolve with the market will be most likely to succeed. As the AIA's 2013 Foresight Report states, "The push for measuring the effect and benefit of design is increasing as performance data becomes more plentiful".[5] The shift in client demands, increased information, and new market competition are all potential threats, not only to individual firms, but also to the profession. Energy code compliance is not meant to represent the solution to address these threats, but a strategic approach to the implementation of energy related design can lead to some new opportunities.

Policy adoption and technological advancements have increased access to building performance information. As owners continue to monitor this information and demand energy efficiency, the pressure to deliver performance also increases for

[5] American Institute of Architects. AIA Foresight Report: The Changing Context, Business, and Practice of Architecture. 2013

design professionals. As accountability for building performance mounts, architects that have not dedicated themselves to delivering energy efficiency will be less in demand. Energy code compliance is one way that architects can take control and ensure a certain level of building performance *and* job security.

The financial crisis led to a significant reduction in new construction projects and existing building renovations currently account for a significant portion of firm billings (**Figure 4**). The aging building stock and focus on energy is an opportunity for architects to position themselves for growth in the market. Recent market analyses by numerous groups has confirmed that the market for retrofits could deliver tremendous savings for owners; a study by the Rockefeller Foundation and Deutsche Bank Climate Change Advisors projects that the projected energy savings in the retrofit market could be upward of $1 trillion over the next decade.[6]

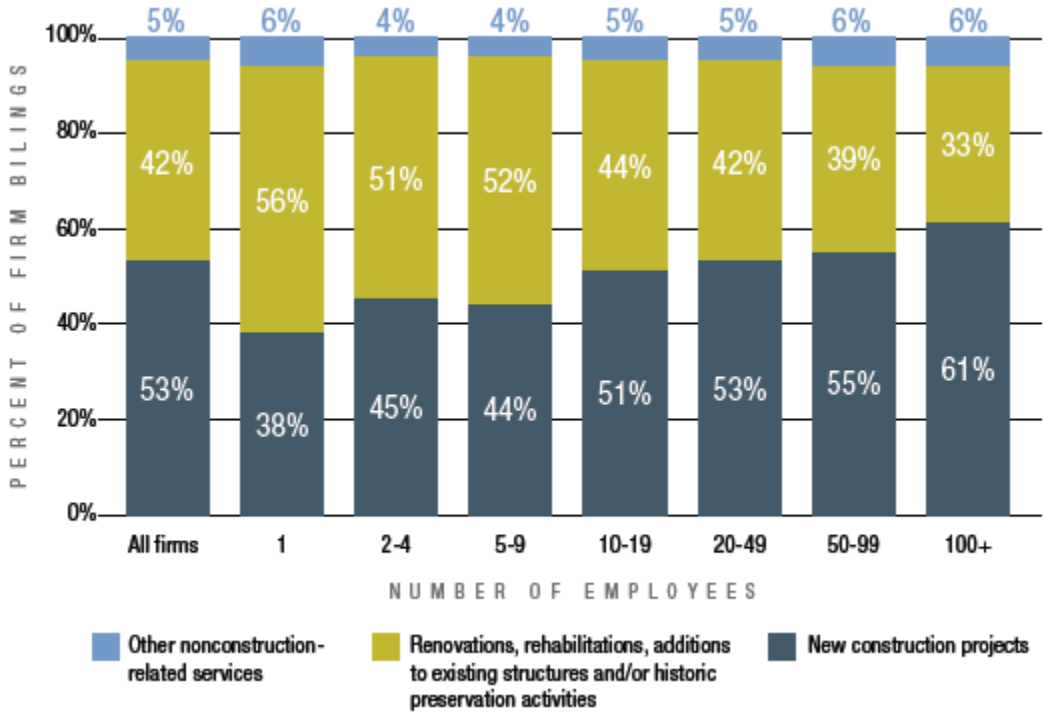

Figure 4: Percentage of Firm Billings by Project Type[7]

However, the growth in this market has also led to the rise of Energy Service companies (ESCOs) and their prominence in the market. While architecture revenue declined by 40 percent between 2008 and 2011[8], ESCOs revenue has been

[6] American Institute of Architects, Rocky Mountain Institute. Deep Energy Retrofits: An Emerging Opportunity An Architect's Guide to the Energy Retrofit Market. 2013
[7] Id.
[8] American Institute of Architects. The Business of Architecture: 2012 AIA Survey Report on Firm Characteristics. 2012

increasing by over 7% since 2006 and are expected to growing faster than the domestic economy.[9] One aspect of the ESCO service model that is very appealing to owners is that they arrange financing for their projects, which incentivizes them to deliver on their energy savings estimates. As the focus on building performance continues, ESCOs are well positioned to expand the scope of their services and perhaps offer more design related services. This could diminish the value that owners place on architects and their design skills.

Architects need to seize the opportunity to define the value of design in a manner that appeals to clients. Their skills for coordinating a variety of different professionals to deliver quality results makes them ideal candidates to serve as a project leaders in deep energy retrofits. The growth of ESCOs has been primarily concentrated in municipal, university, school, and hospital (MUSH) markets. There is an opportunity for architects to expand their service offerings in the commercial market where ESCOs are not as active and architects have established relationships. Architects positioning themselves into this role in the energy retrofit market will take some effort, but the ability to communicate the value of design strategies to owners and a track record of delivering savings through energy code compliance could serve to increase market penetration.

WHAT CAN BE DONE?

The recommendations listed in the previous section are meant to present approaches that architects can take to make the energy code a tool in taking responsibility for building performance, meeting the 2030 Challenge, and advancing their practice and the profession. The next step is to identify tools and resources that could help architects enact those recommendations and implement the energy code more effectively. The goal is to motivate architects to support improvements to the energy code, but to do so it is crucial that the challenges in implementing the code are addressed and that the needs of architects are met.

Outreach to Architects

The AIA has made a commitment to take responsibility for the impact that buildings have on our environment, but the challenge is to fully engage their membership to take action. In order to motivate a diverse membership community to become active supporters of sustainability and energy efficiency initiatives, it is important to explain how it aligns with their goals and addresses their needs.

One step in doing so is ensuring that building energy performance is integrated into the membership's understanding of design. The current environment has shown that it is a crucial element in defining the success of a building; and it is important that AIA make this clear that energy performance is a component of good design. This message should be in line with the repositioning goals that are currently being developed.

Second, the importance of the effectively implementing energy efficiency measures, like the energy code, needs to be expressed to the membership. The code not only represents a way to meet the goals set forth in the 2030 Challenge, it can

[9] Navigant Research. The U.S. Energy Service Company Market. 2012. Retrieved from http://www.navigantresearch.com/research/the-u-s-energy-service-company-market

also provide opportunities for architects to increase their influence in the decision making process, and serve as a tool expand their market services.

Lastly, the importance of building energy codes is often overshadowed by the challenges that implementing the code presents. If the implementation of the energy code hinders operations and takes time away from activities that create more value for a firm, then there is little chance of architects becoming advocates for the code. The list below presents some initiatives that BCAP proposes to help make the energy code process less burdensome for architects.

- Code Book Companion – architects are responsible for code compliance but one of their biggest complaints is that building codes are difficult to understand. A companion guide to the energy code could be developed as a technical resource that presents the code provisions in a manner that is more conducive to the way that architects communicate and retain information. With assistance from the ICC, architects, and other interested parties; a guide could be developed to help make it easier for architects to understand and implement the energy code.

- Integration of Design Tools and Code Compliance – code reviews and compliance work are often conducted as a separate activity from the design process; sometimes by individuals not involved in the design. This highlights the disconnect that exists between code compliance efforts and the design work. Unfortunately, with regard to the energy code, design has a tremendous impact in the effectiveness of the code. One way to ease the burden on architects and promote better performance is to integrate code compliance with the tools that architects use in their daily operations. Technology like Building Information Modeling (BIM) software already has the capability to incorporate large amounts of data into the design process. One could partner with software companies to integrate code compliance in a way that delivers better results without increasing the burden on architects.

- Student Education - A recent McGraw Hill survey stated that 25 percent of architects expected there to be a shortage of architects in 2014; partially due to a lack of green skills among architects. That is why it is important to reach out to architecture programs and seek to provide more courses that provide students with skills that meet the needs of firms. Courses could be developed in partnership with energy efficiency and sustainability experts and integrated into the coursework for interested architecture programs. These courses could include: energy modeling, performance analysis, and energy code application.

  Autodesk, a multinational software corporation, is already offering a Building Performance Analysis to students and could serve as a potential partner.

- Professional Education - The AIA already provides some educational material related to codes and has reached out to BCAP to discuss the development of webinars on the energy code. Courses should also be developed to educate architects on the economic drivers that drive client decisions and how architects can use that knowledge to communicate their designs to clients more effectively.

- Participation in Code Development - The AIA and its local chapters need to become more involved in the development of building codes and serve as a voice that addresses their issues with building codes and supports

the energy code. AIA National should generate communications and coordinate members from local chapters to attend code hearings across the country. BCAP already distributes Code Alert communications that could serve as a way for chapters to stay informed of potential hearings or calls for action.

CONCLUSION

Energy efficiency and building performance are becoming increasingly more important in the building industry, and architects need to be ready to address those issues. It is important for the profession to take a leading role in the evolving market by accepting energy efficiency and sustainability as part of their responsibilities. Supporting the energy code and striving for compliance is an important step. It represents a chance to have a positive impact on the built environment and a chance to expand their influence. In an increasingly competitive market, architects need to find opportunities for growth. The growth of ESCOs and the trend toward energy performance disclosure could pose a threat to architecture firms that are not prepared.

Currently, architects have shown little interest in guiding the development of building codes, but it is an issue that greatly affects their operations. It is imperative that architects become engaged in the development of building codes, especially the advancement of the energy code, to ease the burden that code compliance has on a firm. More so than other codes, the energy code allows architects to associate value with their design strategies, therefore gives them more influence with clients on design decisions.

One of the key components in rallying architects to support the energy code is to address the challenges that its application poses to them. In the current state of the market, many architects are rightfully concerned about the security of their practice. That is why it is important to provide architects with resources and tools that educate them and make energy code implementation as easy as possible. By addressing the immediate challenges that architects face with regard to the energy code, we can start shifting the focus to the environmental and financial benefits that come with embracing building energy performance.