# ISSUE PAPER

## Reducing the Carbon Footprint of the Built Environment

*A Roadmap for Action After COP21*

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### INTRODUCTION

For more than 150 years, the more than 86,000 members of the American Institute of Architects (AIA) have worked to advance our quality of life through design. From designing the next generation of energy-saving buildings to making our communities healthier and more vibrant, architects play a central role in influencing and advancing a better built environment through their work.

*The AIA and its members stand ready to work with policy makers to advance policies that encourage policy solutions for a sustainable and prosperous future,*

As the 196 parties to the 21st Conference of Parties (COP21) gather in Paris, France, to forge a global climate change action plan, the AIA and its members stand ready to work with policymakers in the United States to advance policies that encourage policy solutions for a sustainable and prosperous future, including energy conservation and the development and use of renewable energy in the built environment, and to work with its allies in the international design community to help reduce the impacts of the global built environment on the planet's climate.

Architects are uniquely positioned to lead efforts to increase energy efficiency and incorporate renewables in the built environment through their work and as creative design problem-solvers. From establishing the project mass and orientation to incorporating passive lighting and ventilation strategies, architects make numerous decisions that are the key to reducing the energy consumption of building designs.

For years, the largest source of energy demand in the United States has been for the operation of buildings. In 2011, 43 percent of all energy consumed in the United States was dedicated to the heating, cooling, and powering of buildings, outpacing demand for both industry and transportation. When analyzing demand for electricity only, building operations account for more than 75 percent of all electric use. As a whole, buildings are responsible for more than 40 percent of all U.S. carbon emissions. The effects of climate challenge cannot be addressed without changing the way our buildings are designed, constructed, and operated.

Globally, urban areas are responsible for over 70 percent of global energy consumption and CO2 emissions, mostly from buildings.[i]

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The architecture community has responded with multiple efforts to help reduce U.S. and global energy demand through more energy efficient building design and construction. The Architecture 2030 Challenge, the 2012 International Green Construction Code (IgCC), and the UIA 2050 Imperative, along with a steadily increasing consumer demand for environmentally responsible buildings and products, show that high-performing building design will be a lasting shift in the construction industry.

For architects, the majority of high-performing design efforts have focused on producing highly-efficient new buildings, largely due to easier adoption of new technologies in new construction. Energy efficient design in the existing building stock, however, is a less mature market, despite the fact that each year another 5 billion square feet of existing buildings are renovated – equal to the yearly total square footage of new construction.

Currently, energy efficiency in existing buildings is most often addressed by upgrading outdated engineering systems, such as lighting and HVAC systems, with better-performing technologies. This sort of standard retrofit saves energy and addresses some of the large energy inefficiencies in existing buildings; however, this limited scope prevents a building from realizing much greater savings. A design-centered, holistic approach to a retrofit, in which all the interactions in a building's systems are considered, can yield substantially higher energy savings. Architect-led retrofits of this type, called deep energy retrofits, aim for energy savings upwards of 50 percent.

## ENERGY EFFICIENCY IN NEW BUILDINGS

The new building market is a key driver in the development of advanced energy efficiency technology and investment. Since architects can direct a building's energy consumption in overall building design, increases in efficiency are somewhat easier to achieve in this market. However, lack of knowledge and training, financing, and commitment drives building owners to often opt for less expensive, less efficient building designs

### Building Codes and Standards

Some of the easiest ways states can encourage increases in energy efficiency in new buildings are through the adoption of policies that require new construction to hit certain energy efficiency goals. The three most commonly adopted policies that establish these goals are codes, standards, and rating systems.

- A building code is an enforceable body of rules that governs the design, construction, alteration, and repair of buildings by establishing minimum requirements to ensure the health, safety, and welfare of occupants and neighbors. The 2015 International Energy Conservation Code (IECC) is the latest national model code developed by the International Code Council (ICC).

- A building standard defines a specific path—or a variety of alternatives—to achieve a desired outcome in a building. ASHRAE Standard 90.1-2013 is the most recent national model energy efficiency standard developed for nonresidential buildings.

- Building rating systems establish terms of measurement for the performance of building components to reduce energy demand beyond the minimum requirements set by codes. In the past two decades, green building rating systems like the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) suite and the Green Building Initiative (GBI) Green Globes program have emerged for the purpose of rating the overall performance of buildings with respect to energy consumption and other environmental considerations.

Numerous research reports from the U.S. Department of Energy (DOE), regional energy efficiency organizations, and other advocates indicate that smart building energy code policies are one of the most fundamental, affordable, and effective mechanisms for decreasing energy waste, increasing comfort, creating jobs, and reducing negative health and air quality impacts.

In separate studies, DOE concluded that compliance with the 2012 IECC yielded substantial life-cycle energy cost savings – more than 30percent compared to the 2006 IECC – in both residential[ii] and commercial[iii] buildings across all building types and configurations in states in every climate zone.

A 2010 Institute for Market Transformation (IMT) report[iv] estimated that for each dollar spent to improve energy code compliance yielded more than six dollars in energy savings for American consumers.

Based on national GDP and energy consumption data, the Energy Efficient Code Coalition (EECC) concluded[v] in 2014 that the traditional link between U.S. electricity demand and economic growth from the previous century has been broken as the nation has achieved improvements in energy efficiency for buildings and appliances through codes and standards.

The adoption of updated energy codes and standards paired with implementation policies to encourage compliance yield significant energy cost savings at a national, state, and individual building level.

### Tax Incentives

Unfortunately, energy efficient building systems remain significantly more expensive than other less efficient systems. Policies that encourage building owners to invest in these systems are key to market uptake.

Tax incentives like the federal Energy Efficient Commercial Building Deduction (Internal Revenue Code Section 179D) help building owners finance the cost of energy efficient building systems.

Section 179D provides a $1.80 per square foot deduction for certain energy efficient commercial building property expenditures that increase the building's efficiency by 50 percent or more over ASHRAE 90.1 2001. In the case that a building does not meet the 50 percent energy savings requirement, a partial deduction of $0.60 per square foot is allowed separately for building envelope, lighting, and HVAC systems that are certified as meeting required savings targets.

To encourage the public sector to also increase energy efficiency, the 179D deduction provides a federal, state, or local government owner of a commercial building an election to allocate the tax deduction to the primary person responsible for designing the energy efficient enhancements installed in the building.

In the short term, the 179D deduction enables building owners to offset the often costly expenses associated with energy efficiency enhancements. In the longer term, building owners who take advantage of the 179D deduction realize significantly lower energy costs, the benefits of leading edge design and construction that enhances the building's long-term market value, and the benefits of a cleaner environment.

In the case of a public entity, the allocation of the 179D deduction results in immediate savings by allowing the public entity to negotiate a better deal and, in the long term, allows the public entity to realize ongoing energy savings. The average 179D project (typically $0.60/sq. ft. for lighting upgrades) saves a public entity an average of 20 percent on their energy expenses.

Tax incentives like 179D become tools to finance energy efficient systems, and make building owners more likely to choose these upgrades. Including these sorts of tax policies on the federal and state level can significantly increase energy efficiency nationally.

AIA 2030 Commitment

Even with regulatory and financing tools, building owners at times need additional support and motivation to invest in deeper energy savings. That is why peer challenge programs like the Department of Energy's Better Building Challenge and AIA's 2030 Commitment are important in encouraging buy-in among building owners and design professionals. These programs create a network of peers that can motivate the industry to act on its own to increase energy savings.

For example, the AIA 2030 Commitment program is the AIA's cornerstone effort to demonstrate the progress AIA member firms are making toward carbon neutrality by the year 2030. It asks firms to transform how they approach practice by focusing on the design and performance of their entire design portfolio rather than individual, exemplary projects. To date, more than 230 firms have made the commitment, ranging in size from sole practitioners to multinational firms.

A key element of this initiative is the firm's commitment to assess their work on an annual basis and report progress to the AIA, which in turn compiles, analyzes, and disseminates this information. This enables firms to compare their portfolio's performance to those of their peers.

The recently released AIA 2030 2014 Progress Report found a growing number of architecture firms reporting data, a 41 percent increase from 2013. In addition, nearly a quarter of a billion square feet of reported projects are hitting the current target of 60% reduction in fossil fuel use.[vi]

Building on the 2030 Commitment, in 2014 the International Union of Architects (UIA) unanimously adopted the 2050 Imperative, which sets a goal of reducing carbon emissions to zero by 2050.[vii]

## ENERGY EFFICIENCY IN EXISTING BUILDINGS

Increasing energy efficiency in the existing building market is more complex than in the new construction sector. Design challenges associated with older buildings and their systems often present obstacles to owners' interest in retrofitting their buildings.

However, architect-led deep energy retrofits can help unlock the potential of the existing building market. By taking a holistic, building-systems approach, these retrofits can ease the burden on any one particular system to carry the energy efficiency gains for a building, allowing an owner to customize the best approach to energy efficiency for her particular building.

### Market Opportunity

The promise of the energy retrofit market lies in the sheer number of buildings in the United States. Most of the buildings erected in the second half of the 20th Century were built with little regard to energy use or impact on the environment. At a time of low-cost energy and little, if any, awareness of the impacts of carbon emissions and other pollution, energy and environmental performance considerations were largely absent in building design. Our current building stock is dominated by these older, inefficient buildings – as many as 72 percent of U.S. buildings are over 20 years old.[viii]

In the context of a largely older building stock, serious attention to energy performance is still relatively new to the design and construction industry. Until recent years the great majority of buildings were designed merely to meet energy codes, if they existed at all, not to optimize energy efficiency. As a result, older buildings waste billions of dollars in energy due to inefficient design, controls, deferred maintenance and outdated equipment.

By improving building performance through smart design and updated technologies, building owners can unlock value currently trapped in their buildings. Savvy owners, design and construction professionals, investors, and government officials are beginning to understand that energy efficiency is not only about preserving the environment; it also represents hundreds of billions of dollars in reduced waste – and potential profit.

Recent market analyses have confirmed the scale and scope of the building energy efficiency market. In their March 2012 joint report, the Rockefeller Foundation and Deutsche Bank Climate Change Advisors found that improving efficiency by 30

percent in the nation's pre-1980 building stock would result in $1 trillion dollars of energy savings over 10 years, requiring an upfront investment of just $279 billion dollars, a simple return on investment of 358 percent over a decade.[ix]

The commercial building market alone represents a $72 billion investment opportunity. A 2010 McKinsey & Company study found a very similar potential value of commercial building retrofits, at about $73 billion dollars.[x] And studies by Rocky Mountain Institute[xi] and the American Council for an Energy Efficient Economy[xii] have reached similar conclusions.

Market Drivers

Along the same lines as the new building market, the strong market potential for energy retrofits in existing buildings will not be realized without fully engaging building owners. For most of the 20th century, property owners focused on merely providing the minimal operating conditions for building occupants: heating, cooling, power, water, and sewer service. Building owners are becoming increasingly aware of the substantial benefits of improving the performance of their buildings while at the same time improving operating conditions.

McGraw Hill Construction's 2011 survey of American businesses showed that 78 percent of surveyed respondents planned energy efficiency upgrades in their building portfolios.[xiii] Though many of these improvements may be moderate or incremental in scope, such as replacing incandescent lights with CFLs or upgrading inefficient HVAC equipment, the desire to make them signifies a general recognition among commercial building owners of the benefits of energy efficiency.

While this is encouraging information, many building owners do not yet see energy efficiency as a core business priority. This is due to a variety of factors, among them, competing demands for owners' limited capital and the split incentive (addressed later in this comment) where tenants pay the utility bills but the building owner pays for capital improvements to the building.

Despite these business-related challenges, an important regulatory factor that is elevating energy efficiency as a priority is the wider adoption of energy disclosure policies, which require building owners to publicly report their buildings' energy use.[xiv] This makes owners more aware of their buildings' energy consumption and allows the real estate market to value energy efficiency by informing prospective buyers and renters of a building's energy performance. As more jurisdictions adopt these policies, demand for energy efficient buildings will likely grow, in turn fueling the demand for deep energy retrofits of owners' existing properties.

In hopes of capitalizing on the growing demand from building owners and tenants, the financial community has devoted substantial capital and attention to creating investment opportunities in energy efficiency. Bank of America launched its $20 billion clean energy investment strategy with $150 million in energy efficiency projects in its own buildings across the country; they've reached their $20 billion target a full four years earlier than projected.[xv] Barclays Capital has committed a $650 million line of credit to the Carbon War Room's PACE Commercial Consortium for building retrofits in California, Florida and elsewhere.[xvi] Wells Fargo provided or raised about $2 billion for energy efficiency retrofits in 2011.[xvii] Other major finan-

cial institutions from conventional investment banks like Citi to private equity funds like CleanFund have moved from interest to seeing real "deal flow" in projects.

The Energy Efficiency Retrofit Market Today

In 2010, a number of institutional investors and energy efficiency allies partnered with Capital-E, a private equity financing group, to more clearly understand the current landscape for building retrofits, and to identify the barriers to capturing the full potential of the energy efficiency market. The Capital-E report identified three main challenges to financing energy efficiency retrofits:[xviii]

- Split incentives, where tenants pay the utility bills but the building owner is required to fund the upfront capital costs for building upgrades;
- Insufficient credit, due to commercial real estate business models and legal structures, discussed below in more detail, and
- Limited data on long-term energy performance for individual buildings and aggregated building types.

Because of these challenges, most retrofit activity has been isolated to the one segment of the building market that inherently avoids these barriers to financing- publicly owned buildings. Government entities, from the smallest villages to the U.S. General Services Administration (GSA), are very well structured for long-term energy efficiency investments.

Public building owners generally:

- Pay their own utility bills, so building owners can directly capture the energy and cost savings from a building upgrade;
- Have sufficient credit to engage in contracts ranging from 5 to 20 years; and
- Have tracked their own energy consumption for two or more decades, helping identify the most attractive and cost-effective energy efficiency projects within their building stock.

Consequently, energy efficiency contractors and other service providers have focused on serving the MUSH market:

Municipal (city, township, state and other local governments)

Universities and colleges

Schools (K-12) and

Hospitals

MUSH market energy efficiency is currently dominated by Energy Services Companies, or ESCOs, which brought in aggregate revenues of about $5.1 billion in 2011.[xix]

The National Association of Energy Service Companies defines an ESCO as a "business that develops, installs, and arranges financing for projects designed to improve the energy efficiency and maintenance costs for facilities over a seven to twenty year time period. ESCOs generally act as project developers for a variety of equipment replacement tasks and assume the technical and performance risk associated with the project."

The MUSH market and federal buildings account for almost 85 percent of all ESCO revenues, in large part due to the security and long-term certainty of contracting with government at the local, state and federal levels.[xx]

ESCOs generally operate under Performance Contracting authority, wherein the ESCO guarantees that the building owners will see reduced operating costs due to the energy savings project. In exchange for assuming the technical and performance risk, ESCOs are able to secure margins in excess of 10percent. With long-term contracts often stretching to 20 years, ESCOs can absorb any unexpected equipment costs or reduced performance because most years result in energy savings far in excess of the contract costs to both ESCOs and owners.

These "Shared Savings" or Performance Contract projects require long-term contracts to help ESCOs reduce their risk under guaranteed savings contracts. As a result, guaranteed savings projects have traditionally relied on well-understood and predictable energy efficiency measures. These services tend to focus on technology solutions (energy efficient technologies accounted for 75 percent of ESCO revenues in 2008) and deliver median energy savings of about 15-20 percent of the utility bill baseline.[xxi] The most common technologies are lighting, which is installed in 80-90 percent of ESCO projects and HVAC controls, which are installed in about 80 percent of projects.[xxii]

As the ESCO industry has developed, retrofit projects that consist of groupings of different energy upgrades have become more common, but these measures are still mostly equipment-focused. Energy conservation measures that address the building envelope are rare, appearing in only 17 percent of ESCO-led retrofits in the MUSH market.[xxiii] An architect-led deep energy retrofit, which employs a mixture of plug-load reduction, passive design strategies and mechanical energy efficiency measures implemented within a holistic design framework, can deliver greater, more cost-effective energy savings.

## FINANCING TOOLS FOR DEEP ENERGY RETROFITS

In the MUSH market sector, financing building-scale energy improvements is much easier. Financial investors or lenders know that they can rely on public borrowers' long-term survival. Though the specific credit ratings and financial health of an individual city, county, state, or school district can range from AAA credit to B- credit, these risks are manageable and easily calculated by lenders or investors.

For large-scale projects, including the bundling of energy efficient retrofits of public buildings and the innovative incorporation of renewables, public-private partnerships (P3) can provide an enormous opportunity to reduce carbon outputs, if not eliminate them altogether. The recently released AIA P3 Legislative Resource Guide provides policymakers with information and template language to enable a

policy and legal framework that promotes transparency, guides project identification, and protects taxpayer investments.[xxiv]

Financing building-scale energy improvements for commercial property owners, however, has been challenging for a number of reasons, including lack of confidence in the structure of some real estate owners' businesses and their long term viability.

Despite these difficult circumstances, several financing tools have been developed to address the structural barriers in the private commercial retrofit market.

*1. Energy Savings Performance Contracting – the "ESCO model"*

Energy Service Companies develop, implement and finance energy-savings projects, ranging from low-cost measures like lighting and updated building controls to more intensive energy savings measures like mechanical system replacements. These "ESCOs" are authorized by state law to provide guaranteed savings to the building owner year-over-year, ensuring that the building owner will see both reduced energy costs and reduced risk of underperformance or maintenance issues over the life of the contract. In exchange for assuming this risk, ESCOs frequently earn double-digit returns on these projects, and require longer-term contracts, frequently for 15-20 years.

Best Suited For: MUSH market, with almost no current use in the commercial market.

Geographic Application: All 50 states.

*2. Revolving Loan Funds a/k/a State and Municipal Loan Programs*

The 2009 American Recovery and Reinvestment Act (ARRA) directed more than $3.1 billion into State Energy Programs and an additional $3.2 billion in conservation block grants to cities and counties. Most states, and dozens of cities, used these stimulus funds to establish Revolving Loan Funds (RLFs) devoted to both public and private building energy efficiency projects. The state or local governments provide loans at below-market interest rates to both commercial and MUSH market building owners, after reviewing proposed energy improvements. The credit review and underwriting process is straightforward compared to market-oriented loans, since the federal and state/local governments have established the energy savings as a public good.

In most cases, the Revolving Loan Funds continue past the ARRA stimulus funding timeline. As loans are repaid, the RLF pool is recapitalized, allowing for state and local governments to fund more energy efficiency projects. ARRA funds were applied to both the commercial and MUSH markets, building on the success of smaller-scale RLFs dedicated to governments' own stocks of lower-performing buildings. Many of these local loan programs continue today, even as other stimulus funds have been exhausted.

Best Suited for: Both commercial and MUSH markets.

Geographic Application: Based on individual state and local programs.

### *3. Sustainable Energy Utilities*

A Sustainable Energy Utility serves as a one-stop shop for financing, technical assistance, and financial incentives such as conventional utility rebates. These state-established entities help take the burden off of conventional electric and natural gas utility providers in delivering and financing energy efficiency programs and create enough certainty for private investors and lenders to participate in commercial energy savings projects. Delaware and the District of Columbia have established SEUs with more than $100 million in activity thus far.[xxv] Efficiency Vermont has a long track record of deep success as well, facilitating a total of $27.7 million in commercial building energy improvements just in 2011, in the small, rural state of Vermont.[xxvi]

Best Suited For: Both commercial and MUSH markets

Geographic Application: Currently limited to Delaware, Washington, D.C., and Vermont.

### *4. Mortgage-Backed Financing*

Energy-efficiency-based mortgages create a relatively secure lending structure, because the mortgage provides substantial security for lenders. However, the total project size must be significant in order to justify the substantial transactional costs involved in issuing a mortgage. Further, an energy efficiency-based mortgage is likely to be structured as a second mortgage; in a default or foreclosure, the lender faces far more risk of not receiving the entire principle remaining on the mortgage. As a result, the energy efficiency mortgage is likely to require that borrowers pay interest rates of at least 5 percent, and likely up to 8 percent.

The mortgage lending industry is increasingly interested in this market, given the substantial revenue produced by energy efficiency improvements to buildings. In some cases, lenders seek out energy efficiency projects for buildings targeted for refinancing or for purchase. When included in a first mortgage, these energy projects can be funded for 2-4percent interest rates, given the historically low lending rates today.

Best Suited For: Commercial market

Geographic Application: All 50 states, but with limited market penetration thus far.

### *5. Utility-backed On Bill Financing*

Utility On Bill Financing (OBF) allows electric and natural gas utilities to finance the upfront cost of energy improvements for their customers. The customer then pays the principal and interest as an added charge on their utility bill. The utility serves as a conduit for investors or lenders to reach a volume of borrowers through an investment-grade utility partner. By providing funds first to the utility and then relying on the utility to serve as the direct lender to borrowers, investors rely on the utility's credit should any borrowers fail to repay their loan. The utility is able to substantially minimize nonpayment by lending only to customers with perfect bill payment histories, along with other factors showing financial health, and the utility can threaten to shut off service in the case of late payments. While some state and local policies are pushing utilities to offer OBF to help their customers and ratepayers reduce their energy consumption, most utilities are resisting the push to become both utility provider and energy loan provider.

Best Suited For: Commercial market

Geographic Application: Though growing, currently limited to participating New York and California utilities.

### *6. Property Assessed Clean Energy (PACE)*

Property Assessed Clean Energy (PACE) is a conduit financing tool similar to On Bill Financing. PACE loans are paid back via an additional property tax assessment to local or state governments. For at least 70 years, cities have served as the conduit for commercial property owners to upgrade their properties for such measures as sewer and water services, tree planting or trimming, and even for downtown skyways in colder climates. Twenty-nine states, cities and other jurisdictions are able to provide relatively low-cost financing for commercial property owners to implement energy efficiency and renewable energy projects.

The local government sells a PACE bond to private investors and then uses the bond proceeds to lend to qualified commercial borrowers. The borrower repays the loan via a special assessment added to their property taxes. This primary lien ensures that the local government is repaid before any mortgage is repaid in the case of a foreclosure or other default. The property tax assessment is assigned to the property, not the building owner, allowing loan terms to extend anywhere from 5 to 20 years, depending on the project size and energy savings. In the case of a property sale, the buyer either assumes the property tax payments or folds the additional special assessment into the new mortgage. PACE loans are being provided at rates between 2.5percent and 7.5percent, depending on the size and location of the project.

Best Suited For: Commercial market

Geographic Application: PACE is now legal in 30 states and Washington, D.C., with active programs in California, Michigan, Minnesota, Ohio, Connecticut, Florida, and a few other states.

## CONCLUSION

Buildings account for the largest source of energy demand in the United States and are responsible for more than 40 percent of all U.S. carbon emissions. Globally, buildings and their use account for a significant portion of energy consumption and greenhouse gas emissions. That is why programs that address energy conservation and the use of renewable energy in the built environment are an absolute necessity for achieving any GHG emission reduction goals that arise from the COP21 talks.

A diverse program and regulatory portfolio of energy conservation and the promotion of renewables and peer-challenge programs such as the AIA 2030 Commitment are necessary to address the myriad of challenges buildings owners and design professionals face when exploring opportunities to increase energy efficiency.

Understanding the complex nature of the energy efficient building market and the ways policymakers can encourage its growth requires a holistic, building portfolio-wide approach- a skill that architects rely on every day to help their clients achieve significant energy savings.

Architects continue to stand ready to guide policymakers and building owners in adopting and implementing an appropriate set of policies and programs that reflects the unique dynamics of the national and international design and construction industry.

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