Building a Business Ecosystem for Energy Efficiency

Turning Savings into Value

by
Gary M. Rahl
rahl_gary@bah.com

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The potential for a self-sustaining growth market in energy efficiency (EE) is real and significant, but the path for fulfilling this potential is not as straightforward and well-lit as the public dialogue would indicate. Improvements in the business environment for EE—the nurturing of a business ecosystem that recognizes more of the value of EE—are key and achievable through clear, prioritized actions for business and government.

Introduction

The promise of improving EE in buildings has been around for a long time. For years, industry experts have identified heating, cooling, and lighting in homes, offices, and industrial facilities as a major contributor to our nation's overall energy consumption. In 2009, about 42% of total US energy consumption was in buildings.[1]

Recently, it has become popular to point to the net aggregated savings, US$620 billion by 2020 by some estimates[2], which could result from implementing efficiency improvements. Bold claims of market potential for EE, up to US$1 trillion, have followed closely on the heels of these estimates.[3] Such large numbers may grab headlines, but they fail to give any real idea of how difficult it is to make a market for EE really go. Most reports on the savings potential of EE create a false sense of confidence that these savings are easily achieved; conspicuously absent from these estimates is any practical roadmap for how to achieve them.

The public dialogue on EE in buildings is dominated by two points of view, each of which distorts the challenge. On the one hand there is the "low-hanging fruit" camp (fueled by the aggregate savings reports), which suggests that the savings alone from EE improvements create a compelling market opportunity, appealingly described as "$20 bills lying on the ground." This point of view is challenged by reality: the supposedly billion- or trillion-dollar industry remains small, undercapitalized, and confined largely to buildings in the public and institutional spheres. The other side of the public dialogue provides the reasons why: significant and persistent market barriers deter most building owners from making improvements, ranging from financing to vendor selection to verification standards and workforce development. However, this "market barriers" camp tends to lump all barriers together, creating a "fix everything at once" approach that is as unworkable as its counterpart is unrealistic.

A more promising approach to creating a self-sustaining EE marketplace would begin by recognizing that the savings from EE improvements are real but insufficient to drive investment at scale in many cases, and that additional sources of return from such improvements are needed. Such an approach would also set priorities for addressing key market barriers, but recognize that market participants themselves can best address how to allocate and apply resources.

What's needed is a business ecosystem for energy efficiency. First articulated by business strategist James F. Moore nearly two decades ago, a business ecosystem describes an evolving market environment in which participants (e.g., suppliers, producers, competitors, customers, other stakeholders) have well-understood functions and interrelationships. Key to effectively functioning business ecosystems is the presence of one or more central organizations, whose leadership "is valued by the community because it enables members to move toward shared visions to align their investments and to find mutually supportive roles."[4]

At least initially, the business ecosystem for EE needs active leadership from both business and

[1] US Energy Information Administration Web site; FAQs page for "How much energy is used in buildings in the United States?"; http://ftp.eia.doe.gov/tools/faqs/faq.cfm?id=86&t=1

[2] McKinsey & Company, *Unlocking Energy Efficiency in the U.S. Economy*, July 2009

[3] For example, the American Council for an Energy-Efficient Economy (ACEEE) advertised its Annual Energy Efficiency Finance Forum as, "Tapping into a Trillion-dollar Market"

[4] Moore, James F., *The Death of Competition: Leadership & Strategy in the Age of Business Ecosystems*. (New York: HarperBusiness, 1996)

government. The US electric power system—a critical multi-billion-dollar infrastructure—is the product of such collaboration. In exchange for mobilizing and maintaining significant investments in electric generation, transmission, and distribution infrastructure, policy makers granted electric utilities monopoly rights to provide electric service in defined territories. The basic outlines of this compact devised over 100 years ago produced high-reliability, low-cost power essential to public welfare and the economy; indeed, the companies were often named "Public Service Companies." Today, electric utilities still have a strong hand in the policy development activities that relate to EE market formation. The public sector holds important keys to the success or failure of the EE ecosystem as well, in part, because the distribution and sale of electric power is a highly regulated industry. Another major opportunity in the public sector is the significant direct federal investment, mostly through the US Department of Energy (DOE), in energy efficiency improvements to buildings. Unfortunately, the vast majority of activity by these players is conducted with a narrow view of its purpose, unaligned to a goal of creating a self-sustaining market.

For a successful business ecosystem to emerge, the next few years will need to see a series of skillful public-private interactions in which governments (federal, state, and local) work in new ways with utilities, grid operators, entrepreneurial IT start-ups, insurance firms, consumer advocacy organizations, and many others. This strategic viewpoint provides a first draft of what business and government should focus on as they move together down this path.

The Owners' View

At the core of any EE improvement is a decision by one particular ecosystem participant: the building, home, or industrial facility owner. Nothing happens in EE until an owner chooses to upgrade his or her building. Central to this decision are the economics of the improvements being considered, beginning with but not limited to how the owner will pay for them and the likely return on this investment. Although a multitude of public sector programs are designed to support energy efficiency, in practical terms, most owners today have three basic options for moving forward:

- **Self-finance,** whereby the owner assumes responsibility for selecting an EE provider, as well as all financial obligations, benefits, and performance risks associated with the package of energy efficient upgrades. Many incentive programs are designed to encourage self-finance of energy efficiency (e.g., utility system benefit charges, tax credits, rebates, and cash incentives).
- **Leverage an "owners' intermediary"**—such as an energy services contractor (ESCO)—to acquire a turnkey EE solution, a guarantee of performance, and project financing in exchange for a contractually agreed upon series of payments. The same set of incentives ascribed to the self-finance option is usually available with this option also.
- **Structure a "value stream"-based agreement,** which can take multiple forms, all of which revolve around provision of an integrated package of efficiency upgrades and financing, with payments contingent upon the service provider's ability to capture monetary value from the efficiency upgrade.

Despite decades of experience with self-finance and owners' intermediaries, neither of these models has so far managed to unlock large amounts of energy efficiency investments on an ongoing basis. Neither has spawned a business ecosystem for EE. In 2008, the last year for which data is complete, the ESCO market was estimated at about US$4.1 billion—roughly equivalent to the market value of two skyscrapers.[5] Impressive, but hardly transformational.

Among the reasons these historical approaches have been met with limited success is that electricity prices (and, therefore, electric bills) have been low for a long-time: from 1980 to 2005, electricity prices fell by 25%[6] in real terms. Energy savings alone simply may not be a very big deal to most owners. In terms of household budgets, the fraction dedicated to pay for electricity declined, also; but even at its peak during

5 Andrew Satchell, Charles Goldman, et. al., *A Survey of the US ESCO Industry: Market Growth and Development from 2008 to 2011*, NAESCO.com, www.naesco.org/resources/industry/documents/ESCO%20study.pdf,

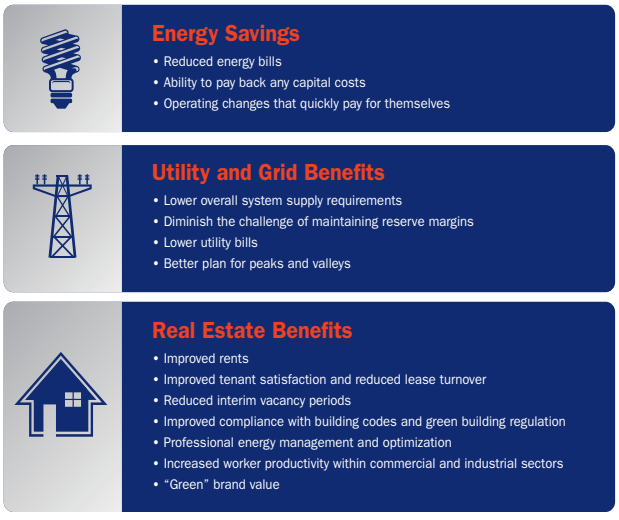
6 The Brattle Group, *Why Are Electricity Prices Increasing?*, www.edisonfoundation.net/Brattle_report_web.pdf, 2006

this period it was very small—less than 4%. While electricity is a much larger portion of the operating budget in the commercial and industrial sectors, the combination of relatively cheap power and the barriers mentioned earlier may explain the experiences some have had that only 10%[7] or so of the energy efficiency recommendations generated by ESCOs are actually implemented by their customers.

An Ecosystem Essential: Capturing the Full Value of EE

Given this context, a self-sustaining market for EE improvement in buildings will have to result from a greater ability to capture the full value of energy efficiency to owners and others in the energy sector. The cultivation of a business ecosystem for EE has to make as much potential value available to potential participants as possible; otherwise, as experience to date indicates, owners will have insufficient impetus to act, and relationships among other participants will weaken. The potential value from EE derives from three major categories: energy savings; utility and grid benefits; and real estate benefits.

Exhibit 1 | EE Value Categories



Source: Booz Allen Hamilton

Energy Savings

EE improvements in buildings result in reduced energy bills, and these savings may be available to pay back any capital costs incurred in the building upgrades. This benefit has been the key selling point to owners for EE improvements for years; unfortunately, it alone is insufficient to drive the market further.

Nonetheless, the ongoing convergence of information technology and electricity delivery is driving significant innovation by entrepreneurs who are testing this experience. Many of these entrepreneurial ventures are based on business models in which feedback on building energy use (as a snapshot or in real time) is provided (via online models or installed systems) at a cost low enough that it is justified by the savings the owner is able to achieve. Such efforts are likely to find a level of initial success in the market because the market is almost entirely latent. Having had little or no granular visibility into energy costs, some owners will easily find operating changes that quickly pay for themselves and the service or installed software.

However, it is unlikely that the excitement around these kinds of solutions can be sustained. Already, IT giants Microsoft and Google are scaling back the emphasis on their residential energy monitoring tools efforts (Hohm and PowerMeter, respectively) because homeowner interest was limited.[8] Others are having better success at using information to change owner behavior, but these businesses are in their early days and the track record is limited. From a societal perspective, another challenge of these approaches is that they do not necessarily encourage deeper building retrofits that can actually lock in energy savings over a sustained period. By skimming the "easy" savings, they may diminish the appetite of owners to go deeper and, therefore, may actually impede the formation of the deepest, broadest market possible.

The business ecosystem that will support formation of a sustaining market will depend on capturing the value of two important but often overlooked sources of value from EE: utility and grid benefits and real estate benefits.

7 Chew, Mark, "Using Automation To Make Energy Efficiency Efficient," *MIT Entrepreneurship Review*, June 28, 2010, http://miter.mit.edu/node/191

8 Kanellos, Michael, "Microsoft Moving Into Building Management, Demand Response," Greentech Media, www.greentechmedia.com/articles/read/microsoft-moving-into-building-management-demand-response/, March 11, 2011

Utility and Grid Benefits

The use of electricity by businesses and homeowners (and, increasingly, drivers of electric vehicles) varies by season and time of day. To account for this, utilities and transmission companies are required to maintain excess capacity beyond the peak electricity usage expected on any given day. This "reserve margin" drives costs to utilities (and sometimes customers) in two ways: the cost of keeping a generation asset on standby, known as "spinning reserve", and the cost of actually delivering electricity to meet demand beyond that produced by a base load generation asset (e.g., a coal or nuclear power plant). Usually, peak loads are met by deploying more expensive sources of power, which become harder to procure—even at very high prices—as the volume of electricity demanded of the grid continues to increase.

At the same time, many utilities also have a requirement to generate a portion of their power from renewable sources. Because many renewable sources—particularly wind and solar—are unpredictably intermittent, they create more peaks and valleys in the power supply profile over time, and they can also create significant stability challenges for the transmission and distribution system.

Reduced energy use in buildings offers potentially significant benefits to utilities and transmission companies. On the generation side, the ability to count on persistent reductions in demand (at great enough scale) may erode demand peaks over time, lower overall system supply requirements, and diminish the challenge of maintaining reserve margins.

Unfortunately, utilities, grid operators, and their regulators have had a difficult time linking the value of EE to these benefits. As a result, most of the credit for EE on overall transmission and distribution performance is captured indirectly, through incentive programs or special charges that are allowed to be included in electricity rates. Such incentives are a poor proxy for the kind of mutually beneficial buyer-seller relationship that characterizes a healthy business ecosystem. Because they are established by entities other than buyers and sellers (e.g., regulators rather than owners, utilities, or their intermediaries), these incentives and special charges can actually impede the kind of market-forming give-and-take in which pricing and technical details are established so that sellers are delivering what buyers need, and buyers are paying for it commensurate with the value it creates for them.[9]

Again, the convergence of IT and the utilities markets is beginning to drive change in this area. Utilities and grid operators have recognized the value of demand response (reductions in energy use at times of peak demand) for several years. The logical extension of demand response is energy efficiency—permanent reductions in demand, valued at peak- and non-peak times. Several independent system operators for sections of the transmission grid have taken steps to recognize a monetary value for verified EE improvements as they plan future capacity needs, and several others are considering doing so. The result is that a range of companies—start-ups and established utilities alike—are looking to expand their business models from demand response into energy efficiency. For this trend to sustain and represent the beginning of market for EE, the electric power industry—utilities, grid operators, and their regulators—will need to come together to develop a stable, consistent approach to assessing and monetizing persistent energy savings from EE improvements in buildings.

For utilities, the promise of energy efficiency is also a strategic issue. Although comprehensive regulation of carbon dioxide emissions did not come to pass in the current Congress, most market watchers believe some form of regulation is inevitable. And utilities are left in a precarious position, with aging generation assets and an uncertain regulatory future. If emissions-oriented mandates emerge that result in higher generation costs (a likely scenario), and the highly politicized process for setting electricity rates lags these costs (also plausible), utilities' financial performance and creditworthiness could be significantly impacted. Energy efficiency can be a hedge against the future regulatory risk caused by automatically defaulting to building more wires and generation to meet load growth. EE is cleaner, can be deployed faster, and,

9 The total energy efficiency delivered in 2009 was just 2.5 to 3 percent of the peak load electricity demand and this was an all-time high. See US Energy Information Administration, *Annual Energy Review 2009*, www.eia.doe.gov/emeu/aer/pdf/aer.pdf, August 2010

ultimately, serves customers better by lowering utility bills and providing a more comfortable environment.

Real Estate Benefits

The incorporation of EE improvements in a building can improve its value as a real estate asset in several ways:

- Improved rents
- Improved tenant satisfaction and reduced lease turnover
- Reduced interim vacancy periods
- Improved compliance with building codes and green building regulation
- Professional energy management and optimization
- Increased worker productivity within commercial and industrial sectors
- "Green" brand value

Unfortunately, these value additions are not systematically captured within the real estate industry today. Commercial building owners may see rent and tenancy improvements, and those who are seeking to reposition certain buildings may understand that "green is the new Class A," but the evidence around this is mostly anecdotal. Worse, it implies a minimum threshold level of retrofit before any recognition of value occurs: Is there no benefit to be realized if a retrofit does not result in repositioning a property to Class A status? And what about existing Class A buildings—is there no point in improving their energy performance?

What innovation and entrepreneurship there has been around the real estate impacts of EE has been focused mainly on mitigating the initial costs to owners through "green mortgages" concepts, recouping capital investments through property tax bills, or other novel business approaches. While these are admirable, and could one day be an enduring feature of a business ecosystem for EE, they may fall victim to the kinds of limitations described earlier for savings-only rationales: if the return to owners is not significant enough, then lowering or deferring the costs to owners will ultimately have limited effect in creating an enduring market.

What's needed is a more comprehensive and systematic approach to capturing the real estate value of EE performance in buildings. While there are many ideas that are specific to each building classification, all would benefit from the development and application of appraisal and valuation guidelines that recognize the value of energy efficiency. Like the electric power market described earlier, the real estate appraisal valuation community is significantly decentralized, with the US federal government, state, and nonprofit organizations each playing significant, but not dominant, roles. Again, the objective of greater valuation of EE will not be achieved through simple means but represents a key pillar going forward.

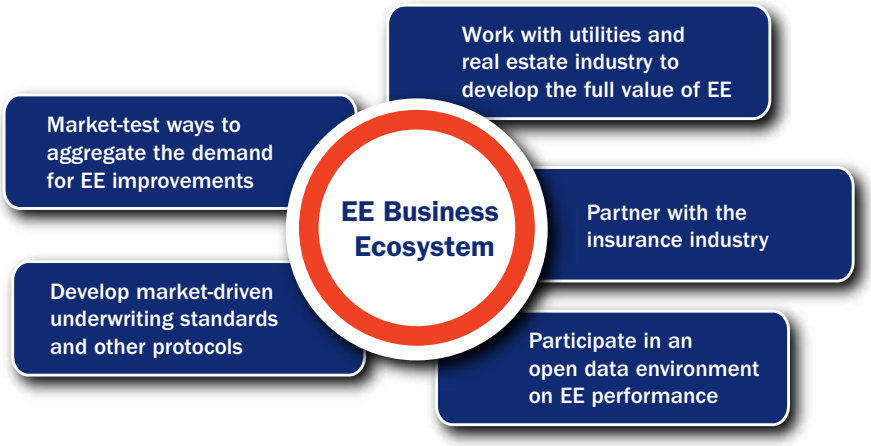
A Five-Point Plan for Business and Government

Today, the market for energy efficiency is based primarily on potential energy savings by owners. Where these savings by themselves are insufficient to inspire a self-sustaining market—and that is the vast majority of places—additional persuasion may be offered. What has resulted across the US is a patchwork quilt of federal and other public investment, subsidy, and incentive payments to encourage owners to make choices they are otherwise not inclined to make. While these forms of persuasion may have some short-term effect, their time-limited and uncertain nature limits them from ever jump-starting a business ecosystem for EE.

Instead, there are specific priority actions that businesses and government can take that will begin to foster market recognition of the tangible benefits of EE. These are the building blocks of a business ecosystem for EE:

- **Work with utilities and real estate industry to develop the full value of EE.** As outlined above, the benefits of EE to the transmission and distribution of electric power, and as a source of real estate

Exhibit 2 | Building Blocks of a Business Ecosystem



Source: Booz Allen Hamilton

value, are underrepresented in the market. The businesses that forge the best relationships with utilities and grid operators—and develop business models that create value for these entities—will be best positioned and have the strongest allies in the negotiations (with public utilities commissions and sometimes the utilities themselves) to monetize the grid benefits of EE. Likewise the businesses that best engage with the various professional associations, nonprofits, and state regulators that develop the Uniform Standards of Professional Appraisal Practice will be in the driver's seat in understanding how improvements in EE may be recognized in future appraisal practice. On these issues, the US federal government and DOE, in particular, could greatly add value and accelerate the emergence of these key building blocks in two ways: first by encouraging its EE grant recipients to begin dialogue with their local utilities, regional grid operator, and/or state regulators on these topics—and transferring lessons learned in real-time; and, secondly, by acting as a convener of national dialogue in both of these areas, inviting key stakeholders from the public and private sectors, as well as civil society, to find practical ways ahead.[10]

- **Market-test ways to aggregate the demand for EE improvements.** The value of demand aggregation may not be immediately obvious in the development of a business ecosystem for EE, but it supports market formation in two separate ways. First, the potential utility and grid benefits of EE require energy savings at a scale that is meaningful when compared to power generation levels. These kinds of potential savings are unlikely to be present in a single building (and certainly not in a single home), but could result from the improvement of portfolios of buildings. Second, a business able to aggregate energy efficiency deals having like qualities (e.g., credit profiles, contractual arrangements, delivery dates, repayment periods, customer types) and offering them to efficiency service providers and finance sources could find an interesting market niche that could serve as a market accelerant in several important ways: reducing transaction costs; improving risk management; and creating better financing terms via bulk contracts. Again, the DOE could leverage its existing grant recipients, along with its incredible technical resource in the national laboratories, to specifically prototype models and analytical tools for aggregating demand.

[10] Useful concepts and techniques for this kind of engagement can be found in *Megacommunities,* written by several Booz Allen thought leaders. Marc Gerenscer, Reginald Van Lee, et. al., *Megacommunities: How Leaders of Government, Business and Non-Profits Can Tackle Today's Global Challenges Together* (New York: Palgrave Macmillan, 2008)

- **Partner with the insurance industry.** One particular flawed line of reasoning in the savings-only approach to market formation is that banks and other sources of finance would lend more freely for EE projects if only they understood how low-risk and reliable they are. Some seek a "master analysis" that would prove the point, and unlock mountains of private capital. Unfortunately, financiers are not equipped to judge the robustness of such an analysis, and would not be persuaded by it. Analysis is not the same as the assumption of risk, and it is the willingness to guarantee results against risk that persuades lending decisions. But banks do recognize risk transfer instruments, such as insurance, and the insurance industry does have the analytical capability in-house to understand the data and use it as a basis for development of an insurance product that underwrites the risk of EE projects. An insurance product underwriting an EE project would represent a risk transfer mechanism that financial institutions do understand, and which could potentially increase the willingness of the financial institution to lend.
- **Develop market-driven underwriting standards and other protocols.** A thriving business ecosystem for EE will be underpinned by underwriting standards that serve as effective vehicles for defining risk elements, allocating liability, and determining work-out procedures. The success of these standards will be a function of their compatibility with existing commercial practice, the extent to which investors understand and are comfortable with the terms and their administrative practicality. In particular, the protocols for ensuring energy savings are actually being delivered (measurement and verification [M&V] protocols) should be market-driven, and not based on esoteric views of "how much certainty is enough." In a successful EE ecosystem, the level of M&V implemented will be enough to satisfy those other ecosystem participants to perform their functions and no more. Many potential ecosystem participants have worked on M&V protocols over the past several years and multiple varieties exist. The ecosystem for EE could get a near-term boost if a leading organization such as the DOE would sponsor a structured dialogue aimed at reaching consensus on a more uniform M&V framework.
- **Participate in an open data environment on EE performance.** While there is no "magic bullet" that will unlock capital investment in EE, the pricing of risk can be improved through better information. One of the most promising projects underway at the DOE is the development of a National Energy Performance Data Warehouse, which will make available all of the data within the government on the performance of federally funded EE improvements in buildings. When finished, the data will be kept in an open environment. Market participants can perform their own analyses, and will have an opportunity to add their own data. The data warehouse should quickly become the definitive source for EE performance data—and the existence of such a source will support the development of common understanding among ecosystem participants, increasing the confidence of each in the performance of its function.

Conclusion

The consumption of energy in buildings in the US is a big business opportunity, yet the market that has formed around this opportunity has been limited. No broader market has taken shape, in part because most EE projects have focused only on overcoming transaction-specific barriers. By following the plan in this strategic viewpoint, business and government can work together in a mutually responsive way to create a fertile business ecosystem for EE.

About the Authors

Gary M. Rahl is a Senior Vice President at Booz Allen Hamilton, where he leads the firm's energy business. He has led and participated in the design and implementation of energy technology development programs, enterprise-wide energy strategies, environmental management systems, and the development of environmental regulation and enterprise information management systems. He is the Officer-in-Charge (OIC) for the firm's support to the US Department of Energy's (DOE's) Advanced Research Project Agency—Energy (ARPA-E), the Office of Energy Efficiency and Renewable Energy, and the National Energy Technology Laboratory, as well as for the firm's engagements with electric utilities.

Contact Information:

Gary M. Rahl
Senior Vice President
rahl_gary@bah.com
703/917-2170

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