PikeResearch
Cleantech Market Intelligence

Research Report

Energy Efficiency Retrofits for Commercial and Public Buildings

Office, Educational, Retail, and Other Key Segments and the Effects of Performance Contracting, ESCOs, LEED, and Energy Star

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Section 1

EXECUTIVE SUMMARY

The best-funded opportunities for retrofits today are major upgrades in institutional buildings, especially in federal buildings. This market, already strong because of federal policy mandates, received a significant boost from the American Recovery and Reinvestment Act of 2009 (ARRA). Growth will be focused in the 16 existing Super ESPCs (Energy Saving Performance Contracts) and with businesses that work with the contract holders. The institutional market is booming now, and activity initiated in the next few years will continue through 2013 and beyond. However, federal non-industrial buildings comprise a small fraction of all existing commercial building space. If future federal legislation provides major funding to retrofit state and local educational buildings, on the order of tens of billions of dollars per year for several years, then the institutional market will continue its current boom. But without major funding at the state and local levels, the institutional market growth in major retrofits will start to level off by 2013.

The largest potential for long term, sustained growth in commercial building retrofits, is in the private/corporate commercial space. Although relatively small at present, this market will experience strong growth through 2013 and for many years beyond. Compared to conventional space, high performance green building space is vacant less often. When vacant, it fills more quickly, often at premium prices. Because of this, owners of empty commercial buildings are adopting green retrofits as a market differentiator. Unlike government policies that come and go, this market driver will fuel steady momentum until most commercial building space has been retrofitted for energy efficiency and also for other measures of building performance such as thermal comfort. While technologies developed for the institutional market can be easily transferred to the private sector, different soft skills and financial models are needed to promote retrofits within the various non-institutional market niches.

There are two fundamental perspectives on the market for energy efficiency retrofits in commercial buildings. In a narrow view, the purpose of retrofits is to conserve energy, so the work should be funded by future savings on energy expenditures. In this view, the federal market may grow toward market saturation within a few years, while other institutional markets stagnate (even with the federal stimulus), and the corporate market has a time horizon too short to effect major improvements in energy usage. Although there are opportunities for operational and maintenance improvements, and minor hardware upgrades, the market will grow slowly, until a national carbon trading system and/or extreme energy price inflation create a radical shift. The business model for these retrofits works well in locations with above-average energy prices, but not in other locations.

In a broad view, energy efficiency is one component of a comprehensive program to make buildings more suitable for the activities of their occupants. In this view, retrofits of higher cost can sometimes be financed by the substantially increased productivity of healthier, happier occupants-—3% to 25% increase for office workers, and up to 15% higher retail sales. In some market segments, the relatively minor cost saving on utilities is a welcome side effect, rather than a primary purpose. Although this perspective is rare, it can support a broader market for retrofits today, without waiting for carbon trading or future increases in energy prices. The broad view includes not only occupant productivity, but green branding. Energy Star Buildings and Leadership in Energy and Environmental Design (LEED) are two brands that are expanding very rapidly, with more and more studies documenting the market differentiation advantages of certified buildings.

Building owners and equipment/service providers who subscribe to the narrow view may find it difficult to create compelling business cases for energy efficiency retrofits, and to keep the market expanding through 2013. However, those who adopt the broad view, and find the partners and business models necessary for comprehensive solutions, will find abundant opportunities for growth. Companies that fit their products into comprehensive solutions can rise above the 'green clutter' of information overload, and secure a seat at the initial design table where integrated design occurs best.

Energy efficiency in existing buildings presents a challenge at the forefront of national and global security. Support for energy efficiency retrofits, from public policy and from the market, is growing and changing to reflect this prominent position.

There are numerous market drivers in this field, and plenty of work to be done. However, the actual market for energy efficiency retrofits is relatively small compared to its potential, because of market barriers within various niches of the commercial real estate market. Successful public policies and marketing strategies for energy efficiency retrofits will address the barriers in each niche appropriately.

The commercial real estate market can be divided into segments based on building application and ownership. The primary applications of retail, offices, warehousing/storage, education, and lodging together account for 75% of the floor space of existing buildings. Each of these segments can be further divided by ownership: private owner occupied (60%), private leased (24%), public (11%), and unoccupied. Another division involves location: the market is significantly affected by state and local geographic climate, energy prices, regulations, and incentives. As if these divisions were not enough, the scale of control varies widely across each market segment. A few large, centralized players control a substantial portion of the total floor space at one end of a spectrum, while myriad small, local players each control a relatively small portion.

This report examines some of the primary challenges in each market segment, presents best practices that are addressing these barriers successfully, and predicts the market growth of the next five years.

Table 1.1 describes the order-of-magnitude scope of the national market for energy efficiency retrofits of existing commercial buildings. Each year, the money spent on new construction is comparable to the money spent on energy in existing buildings. Each year, the total new space constructed is comparable to the total existing space renovated. This space (newly constructed and newly renovated) is small compared to the total existing space, which is equivalent to more than 30 years of new construction. One third to one half of the existing space is clearly due for a major retrofit. The other half to two thirds would benefit from minor upgrades now, and major retrofits beyond the five-year scope of this report. In the narrow terms of cost savings from reduced energy costs, on average, the cost saved by minor retrofits is an insignificant portion of most operational budgets, while the cost of major retrofits must be recovered over many years. If all buildings received one comprehensive green retrofit over the next 20 years, the average annual market for retrofit work would have a value of roughly $60 billion treating 3 billion square feet (BSF). Although some of this work will blend into current renovation practices (such as periodic retail upgrades), much of the work will be new business, beyond existing practices.

Table 1.1: Overview of Primary Factors in the Commercial Building Retrofit Market

U.S. Commercial Buildings, New and Existing	Order of Magnitude
Annual new construction, cost	$300 billion
Annual energy used in buildings, cost	$200 billion
Annual new construction, space	2 BSF
Annual major renovation, space	2 BSF
Existing buildings, space	70 BSF
Examples of annual total cost per occupant (mostly labor)	$300 /SF office $100 /SF public K-12
Annual average energy cost (<5% of budget for each building)	$3/SF
Cost of simple energy efficiency retrofit to save 10% energy	$1/SF or less
Cost of substantial green retrofit to save 40% energy and enhance occupant performance	$10 to $30/SF
Cost of typical major renovation	$40/SF
Total cost to upgrade the third of all commercial space that is most due for a comprehensive green retrofit.*	$400 billion
% of national energy consumed and CO_2 emitted in the U.S., by commercial buildings	20%
% of national CO_2 emissions in the U.S. that need to disappear within 5 to 40 years	80%
Five states that together account for 40% of national energy expenditures in commercial buildings	CA, FL, NJ, NY, TX

(Source: Pike Research)

* Note: Although energy efficiency retrofits are a significant portion of a comprehensive green retrofit, it is unclear how the energy efficiency work could be financed alone, unless it is incorporated into comprehensive retrofits providing broader benefits.

If a carbon trading system raises the average price of electricity by 40%, to its inflation-adjusted 50-year high, and the credits are auctioned, this will yield $70 billion in annual revenue, which could be plowed back into energy efficiency measures. This money could provide the funding to retrofit all commercial building space (starting with the third in greatest need, then treating the other two thirds in turn) over the next 20 years, saving 40% of today's building energy use when complete. Smaller increases in energy prices will produce proportionately less revenue.

A program, phased in over five years, to upgrade maintenance into the equivalent of retro commissioning every five years, will have a return on investment (ROI) above 50% the first year, increasing to more than 100% after a few years as a larger portion of all buildings are included. From a marketing perspective, such a program is likely to include LEED and Energy Star Portfolio Manager, the two largest brands in the industry at present. A 50% tax incentive policy for a few years (with a total national value of $1 billion to $2 billion) could help this industry expand into all commercial space, by returning the complete upfront cost within the single-year time frame of many operational budgets.

In summary, the market for major energy efficiency retrofits:

- Under present pricing, will only grow rapidly if energy efficiency is promoted as one part of a comprehensive, well-branded program to increase occupant performance.

- Will grow rapidly if a carbon trading system increases the real price of electricity by 40%, and reinvests the extra revenue from commercial building electricity bills into retrofits.
- Will grow rapidly, if the real price of electricity increases by 100% or more.
- Needs to expand to approximately $60 billion annual revenue within a few years, to support carbon-reduction goals.

A program for periodic minor energy efficiency upgrades (i.e., enhanced maintenance) will have an initial ROI above 50%, and after a few years, an ongoing ROI above 100%. This is true at various scales, from a few buildings to the entire national building stock. A federal one-time investment of less than $2B in incentives could establish the industry, by covering the initial start-up costs that are often higher than existing annual utility budgets. Even without tax incentives, enhanced maintenance can be very cost-effective on a carefully selected subset of buildings,

There is debate in climate change science as to the exact timeframe when an 80% reduction in GHG emissions is needed. This report is based on achieving this milestone in the 2030 to 2050 timeframe. If the entire reduction is needed within the next 2 to 5 years, as some reputable scientists maintain, then the measures proposed in this report would need to be multiplied by a factor of 4 to 10. In other words, the annual market for major retrofits would be in the range of $240 billion to $600 billion. Funding at this level might make sense from a policy perspective, if global climate change is deemed a primary threat to national security.

The body of this report uses the definition of “commercial’ of the Commercial Building Energy Consumption Survey of the U.S. Energy Information Administration (EIA).

“Commercial buildings include all buildings in which at least half of the floor space is used for a purpose that is not residential, industrial, or agricultural, so they include building types that might not traditionally be considered "commercial," such as schools, correctional institutions, and buildings used for religious worship.”

http://www.eia.doe.gov/emeu/cbecs/

In other words, public buildings are included, but multifamily residential buildings are not. This definition differs from common usage in some sectors of the real estate market.

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SCOPE OF STUDY

Pike Research has prepared this report to provide participants at all levels of the U.S. commercial building energy efficiency retrofit market with a practical study of the market. Participants include manufacturers and vendors of hardware and software; providers of design, installation, service, education, and certification; building owners, builders, and advisors; policy makers and analysts. The major objective of this study is to determine the state of the industry and draw conclusions about the likely future growth of the market. The report provides a review of major market segments, demand drivers, market barriers, and opportunities. The report's purpose is not to provide an exhaustive technical or competitive assessment of the technologies and industries covered, but rather a strategic examination from an overall tactical business perspective. Pike Research strives to identify and examine new market segments to aid readers in the development of their business models. The forecast period extends through 2013.

SOURCES AND METHODOLOGY

Pike Research's industry analysts utilize a variety of research sources in preparing Research Reports. The key component of Pike Research's analysis is primary research gained from phone and in-person interviews with industry leaders including executives, engineers, and marketing professionals. Analysts are diligent in ensuring that they speak with representatives from every part of the value chain, including but not limited to technology companies, utilities and other service providers, industry associations, government agencies, and the investment community.

Additional analysis includes secondary research conducted by Pike Research's analysts and the firm's staff of research assistants. Where applicable, all secondary research sources are appropriately cited within this report.

These primary and secondary research sources, combined with the analyst's industry expertise, are synthesized into the qualitative and quantitative analysis presented in Pike Research's reports. Great care is taken in making sure that all analysis is well-supported by facts, but where the facts are unknown and assumptions must be made, analysts document their assumptions and are prepared to explain their methodology, both within the body of a report and in direct conversations with clients.

Pike Research is an independent market research firm whose goal is to present an objective, unbiased view of market opportunities within its coverage areas. The firm is not beholden to any special interests and is thus able to offer clear, actionable advice to help clients succeed in the industry, unfettered by technology hype, political agendas, or emotional factors that are inherent in cleantech markets.

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