



## The Business Case for Building Efficiency

Business leaders are looking for investment opportunities suited to today's fast-changing global economy. Making buildings more energy efficient cuts costs, offers market-beating investment returns, and protects companies from rising energy prices. Removing barriers to building efficiency can both increase corporate profits and unlock job-creating business investment.

United Technologies Corporation  
June 2011

If you have questions or would like to provide feedback, please contact us at [ourapproach@utc.com](mailto:ourapproach@utc.com).

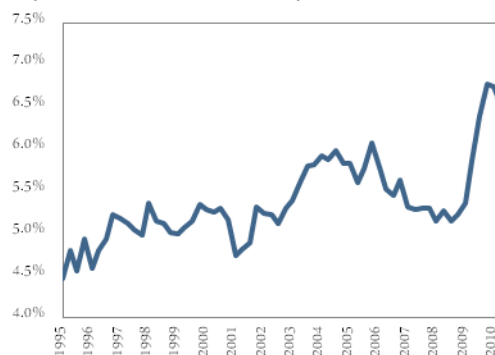
## The Right Time for Building Efficiency

With the global economy still recovering from the Great Recession, companies are more cautious than ever in their investment planning. Businesses face an uncertain policy landscape in developed countries as Washington, Brussels and Tokyo all grapple with large fiscal deficits and a rapidly evolving competitive landscape in global markets thanks to the rise of China, India, and other emerging economies. So while corporate profits have improved in recent years, companies are careful about reinvesting those profits in new business lines or expanded production (see Figure 1, which shows record shares of U.S. corporate assets currently being held in cash or other low-risk, low-return liquid assets).

Rising global energy prices add to the uncertainty businesses face. American businesses spent \$680 billion on energy in 2010, up from \$380 billion in 2000. And the rise in prices has been even more pronounced outside the U.S. Globally, companies now pay more than twice as much for energy than they did a decade ago. And with growing demand from emerging economies, the International Energy Agency predicts that energy prices will rise by at least a further 25 percent over the decade to come (Figure 2). With an increasing share of global energy resources concentrated in politically unstable parts of the world, energy prices will continue to be volatile. Business competitiveness and profitability will increasingly depend on effectively managing energy costs.

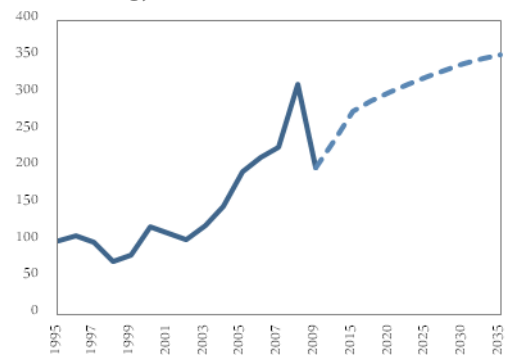
In this environment of economic uncertainty and high and volatile energy prices, building efficiency is an increasingly attractive corporate investment strategy. Improving the energy efficiency of a company's building portfolio increases the productivity of existing assets, guards against future energy price hikes and offers some of the most attractive rates of return available to the business community today.

**Figure 1: Business Investment Uncertainty**  
Liquid Share of Total U.S. Corporate Assets



Source: U.S. Federal Reserve

**Figure 2: Rising Energy Prices**  
Global Energy Price Index – 1995=100



Source: International Energy Agency, Rhodium Group

## Sizing Up the Efficiency Opportunity

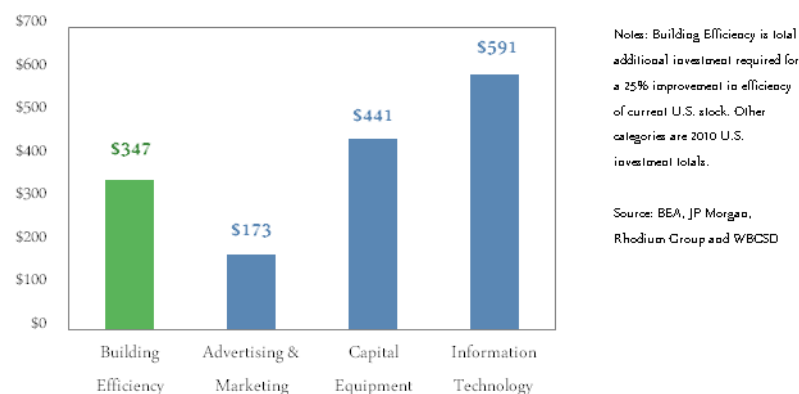
In 2006 UTC, in partnership with the World Business Council for Sustainable Development (WBCSD), set out to assess potential energy savings in the global buildings sector and the economics of energy efficient building technology and design.<sup>i</sup> The project, the most comprehensive undertaking of its kind to-date, analyzed the costs and benefits of energy efficiency improvements in 19 million commercial and residential buildings around the world. The project culminated in a landmark report, published in 2009, on transforming the way buildings use energy. This work has inspired more than 100 companies around the world to launch firm-wide energy efficiency campaigns.<sup>ii</sup>

The WBCSD project had a long-term focus – how to achieve a 60 percent reduction in the amount of energy consumed in buildings globally by 2050. But with rising energy prices, the business community is increasingly interested in options for managing energy costs today. UTC recently set out to answer this question by looking at what it would take to reduce the amount of energy consumed in both new and existing buildings by 25 percent – a goal that is achievable with existing technology - and the business opportunities such efficiency improvements would create.<sup>iii</sup> To conduct this analysis, UTC drew on the unique buildings technology database developed for the WBCSD project, reviewed the most recent academic, market and government research on building efficiency, and employed a suite of energy system models, including the National Energy Modeling System (NEMS), used by the U.S. Department of Energy for official energy supply and demand forecasting.

The results are striking. Improving energy efficiency in buildings by 25 percent would create a \$350 billion market for advanced technology, engineering and design services, and construction activity in the U.S. alone. That’s twice as large as the total U.S. advertising market, and comparable in scale to what American companies spend each year on capital equipment and information technology (Figure 3). For a corporate sector sitting on cash and unsure of where to invest, building efficiency offers a sizeable opportunity.

**Figure 3: The Building Efficiency Opportunity**

Building Efficiency Investment Potential Relative to Annual Business Investment in the U.S. - \$ Billion



And an investment opportunity that is highly profitable. UTC analyzed the rate of return of the highest-performing energy efficiency investments capable of delivering a 25 percent improvement in building efficiency using cost assumptions gathered through the WBCSD project’s extensive market

surveys and energy price forecasts from the U.S. Department of Energy.<sup>iv</sup> At currently projected energy prices, \$350 billion in building efficiency investment would pay for itself through lower energy bills in four years or less (see Box 1 for an example from UTC's own building portfolio).<sup>v</sup>

In corporate finance terms, these investments have an internal rate of return (IRR) of 28.4 percent over a 10 year period. IRR was calculated by scoring the 10 year energy cost savings resulting from the efficiency investments (at a 6 percent annual discount rate) against the cost premium of the energy efficient technology or design option relative to the conventional alternative. An IRR of 28.4 percent is four times better than average corporate bond yields or average equity performance and more than double the returns even high-performing venture capital firms enjoy (Figure 4). That's because the most attractive efficiency technology and design options cost the same or only slightly more than conventional alternatives, but deliver significant energy cost savings. Efficiency improvements beyond 25 percent are technically possible, but less profitable, as investment costs increase and energy savings decrease the closer to the technical frontier you get. But cutting energy demand in buildings by one quarter – a significant start - is possible today with market-beating rates of return.

And the more companies that invest in building efficiency the better the returns on efficiency investments become. UTC analyzed the impact of a 25 percent improvement in the energy efficiency of the U.S. building stock on U.S. energy prices and energy expenditures using the Department of Energy's NEMS model. Reduced energy demand through improved building efficiency leads to a 10 percent decline in electricity prices and a 6 percent decline in natural gas prices as pressure on energy resources eases and demand is supplied through less expensive gas wells and power generation capital stock. Price decreases reduce building sector energy bills by an additional \$20 billion per year on top of the energy cost savings that stem from the efficiency investments directly.<sup>1</sup> This increases the rate of return businesses can achieve from improving building efficiency from 28.4 percent to 34.7 percent (Figure 4).

#### **Box 1: Carrier's Charlotte LEED EB Project**

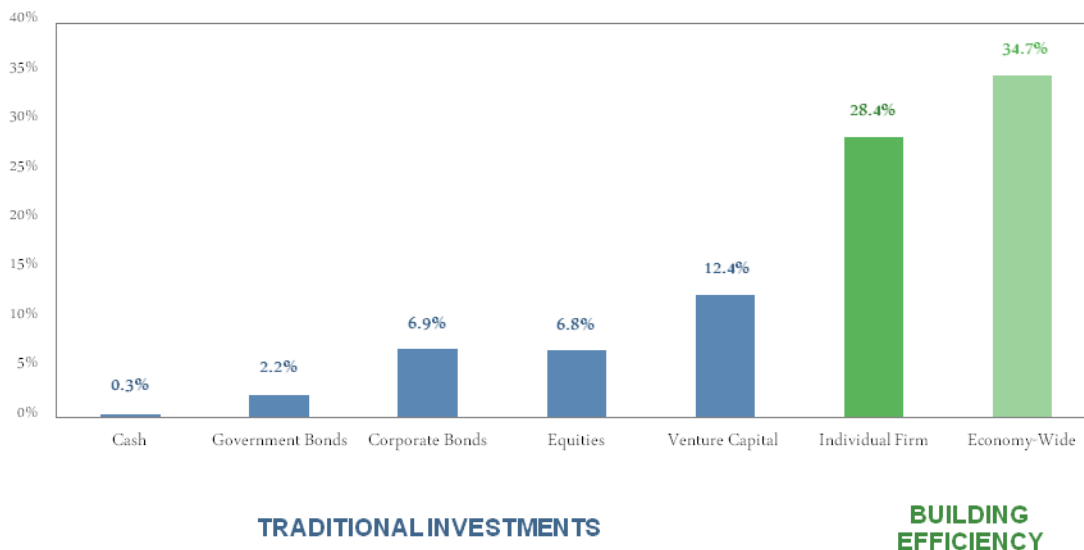
Carrier's Charlotte North Carolina plant manufactures a line for the high-efficiency Evergreen® 23XRV chiller, which is 40 percent more efficient than the industry standard. The Charlotte operation has earned the certification of Leadership in Energy and Environmental Design Existing Building (LEED® EB), one of only 11 factories worldwide at the time to receive such distinction. To earn this certification the plant had to improve the energy efficiency of its operations. The site energy team was able to identify and implement a number of energy conservation projects such as lighting efficiency improvements and building temperature controls, and install a new high efficiency heat recovery chiller and variable speed drive air compressor. The Charlotte plant invested \$528,000 in these improvements and recovered that investment expense through energy cost savings in less than two years.

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<sup>1</sup> Refers to commercial and residential building cost savings from lower energy prices, accounting for rebound effect. Industrial energy consumers would save an additional \$12 billion per year.

**Figure 4: Building Efficiency's Rate of Return**

Internal Rate of Return (IRR) of Building Efficiency vs. Traditional Investment Options



Notes: "Traditional Investments" are average internal rates of return (IRR) over any ten-year period 1930-2010. For "Building Efficiency", IRR estimates are average internal rate of return over ten years of a 25% improvement in energy efficiency of a single firm's building portfolio ("Individual Firm") and a 25% energy efficiency improvement of the entire building stock ("Economy-Wide"). The "Economy-Wide" IRR is higher than "Individual Firm" due to a reduction in energy prices from lower demand.

Source: Rhodium Group, WBCSD, Barclays, and Thomson Reuters.

regulatory, to profitable building efficiency investments. The most important barrier is simply a lack of good information about the opportunity at hand. Businesses are generally unable to compare the energy costs of different buildings when shopping for new floor space because that information is not made clearly available to potential buyers or tenants. Energy efficiency labeling has been extremely successful in enabling consumers to save money when shopping for appliances, and has the potential to do the same in buildings. And high-efficiency demonstration buildings can help showcase the energy cost savings potential of emerging efficiency technologies and designs.

But even when the information is available, businesses don't always have the incentive or ability to make profitable efficiency investments. In most commercial office space, the landlord or building management company makes investment decisions while the tenant or individual office unit owner pays the energy bills. These "principal-agent" problems can be overcome through smart building codes and innovative approaches to efficiency finance. And in many areas, the rules governing electricity and natural gas delivery create barriers to efficiency investments. Modernizing utility regulations can allow both energy companies and building owners to profit from improving energy efficiency.

Finally, the reduction in economy-wide energy prices that can be achieved through broad-based building efficiency improvements don't factor into an individual company's investment decision-making. Labeling, demonstration projects, building codes, innovative financing and regulatory reform can all help improve the profitability of efficiency investments at the company level by reducing energy costs at a national level.

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<sup>i</sup> See <http://www.wbcSD.org> for more information on the Energy Efficiency in Buildings project.

<sup>ii</sup> For more information, see the WBCSD's Manifesto on Energy Efficiency in Buildings at <http://www.wbcSD.org>

<sup>iii</sup> Includes both residential and commercial buildings. Businesses have the potential to invest in residential building efficiency through Energy Service Companies (ESCOs), Demand Side Management programs, or other vehicles.

<sup>iv</sup> See <http://www.eia.gov/forecasts/aeo/index.cfm> for more details.

<sup>v</sup> Energy savings estimates in this analysis assume average, rather than perfect, use of energy efficient equipment as most buildings are not operated in a manner that achieves their full efficiency potential.