



## The Global Market Opportunity

We are in the midst of the largest migration in human history as 60-70 million rural residents in developing countries move to the cities, or see cities built up around them, each year. This trend is improving the lives of hundreds of millions of people, but also straining global resources. To continue reaping the economic benefits of urbanization, countries will need to improve the energy efficiency of both existing and future buildings. Doing so will create a multi-trillion dollar global market for energy efficient building technology and design – a market the US is well positioned to compete in.

United Technologies Corporation  
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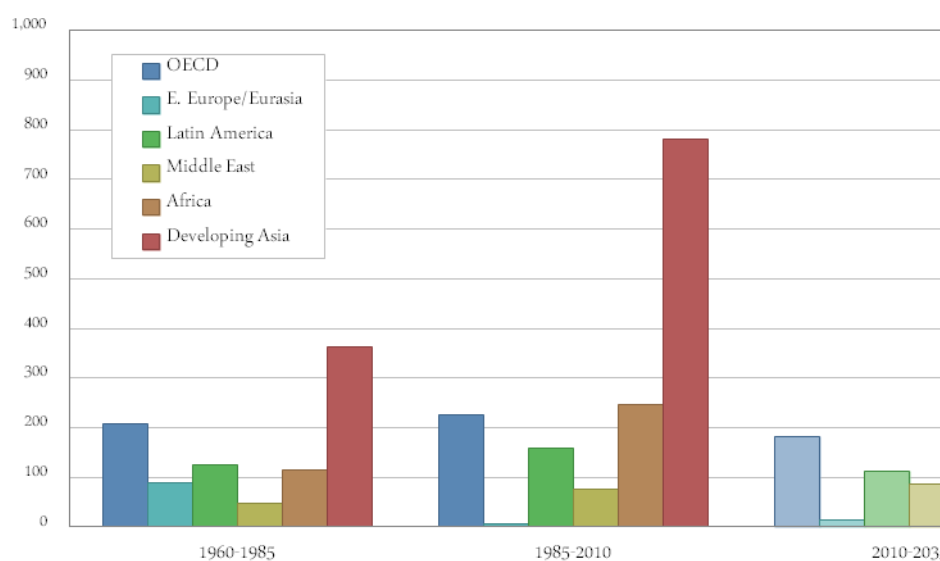
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## Preparing for an Urban Global Future

A decade into the 21<sup>st</sup> century, the world finds itself in the midst of the largest migration in human history. And it's happening within, rather than between, nations as rural populations in developing countries move to cities in search of new opportunities or find cities being built up around them. Between 1960 and 1985, the world's cities grew in size by an average of 39 million people per year. Over the past 25 years, that rate has increased to 60 million per year. Domestic policy reform, expanded international trade and a shift in global economic growth from developed to developing countries have enabled farmers from India to Indonesia to improve their quality of life by moving to urban centers and switching from agricultural to industrial and service sector occupations. Since 1985, developing country cities have added 1.3 billion people sparking a global construction boom of unprecedented proportions (Figure 1).

This global urbanization drive has been particularly pronounced in China. During the 1980s and 1990s, Beijing began loosening domestic restrictions on where Chinese citizens could live and what they could do for work. These reforms, along with China's integration into the global economy created both the motive and opportunity for rural Chinese to move to the coast to work in the country's rapidly expanding manufacturing hubs. Accommodating millions of migrant workers each year required new roads, apartment blocks and commercial buildings. And as economic growth has spread throughout China, large amounts of farmland in the interior has been converted into commercial, residential and industrial real estate. All told, urban China has grown by 360 million people over the past two decades, and by 44 million people in 2010 alone.<sup>i</sup> There is currently more than 60 billion square feet of building space under construction in China – an amount equal to the total building stock of the northeast United States.<sup>ii</sup>

Figure 1: An Increasingly Urban World  
Million new urban residents, past and projected



Source: UN and Rhodium Group estimates

China will continue to grow by 15-20 million people per year at least through 2025, requiring the

construction of an additional 20 billion square feet of residential and commercial floor space annually.<sup>iii</sup> That's the equivalent of building four New York Cities each year between now and 2025.

While urbanization rates have been slower in India than China to date, that's likely to change in the years ahead. The UN estimates the population of India's cities will grow by 300 million over the next twenty five years, and by 2030 will be adding more people per year than cities in China. McKinsey estimates that India will need to add 7-9 billion square feet of commercial and residential floor space over the next two decades to keep pace, the equivalent of adding the entire city of Chicago buildings each year through 2030.<sup>iv</sup> And should African countries prove capable of replicating the economic success of their Asian peers, the nearly 500 million Africans the UN expects to urbanize over the coming 25 years could touch off a construction boom there as well.

## The Global Building Efficiency Market

Urbanization is dramatically improving the quality of life of some of the world's poorest residents. The World Bank estimates that the number of people living on less than \$1.25 a day (their benchmark for extreme poverty, measured in purchasing power parity) has fallen from 1.9 billion in 1981 (one in four) to 1.4 billion in 2005 (one in two).<sup>v</sup> And the Brookings Institution estimates this number fell to 900 million in 2010.<sup>vi</sup>

But it's also dramatically changed the world's energy outlook. Building cities requires enormous quantities of energy-intensive goods like steel, aluminum and cement. And once built, urban residents consume considerably more energy per person than their rural peers. Urbanization trends over the past decade have pushed developing country energy needs 70 percent higher than the International Energy Agency predicted in 2002. This has increased the cost of energy globally and threatens the sustainability of current urbanization rates going forward. Energy efficiency in both current and future buildings needs to improve to accommodate the 1.6 billion additional developing country city dwellers the UN projects over the next 25 years without straining global resource availability and environmental quality.

Developing country governments are acutely aware of this reality and are increasingly focusing on building efficiency as a necessary element of their domestic economic growth strategies. China's 12<sup>th</sup> Five Year Plan (2011-2015) includes a number of building efficiency policies and targets, including retrofitting existing buildings, installing smart meters in homes, and strengthening building codes and appliance efficiency standards. And India's Action Plan for Energy Efficiency released in 2009 outlines Delhi's plans to improve existing and develop new building codes, accelerate labeling efforts and develop minimum efficiency standards.

In addition to helping countries achieve their economic development goals, building efficiency improvements represent a considerable global market 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>vii</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

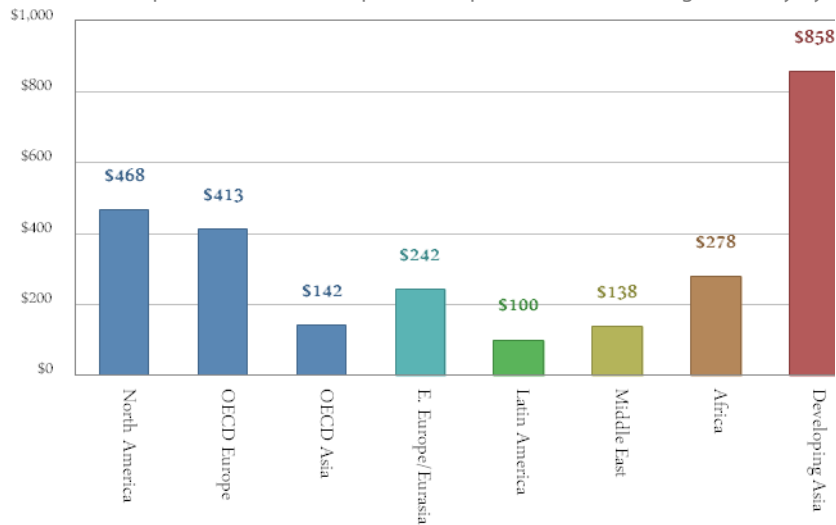
2009, on transforming the way buildings use energy. This work has inspired more than 100 companies around the world to launch firm-wide energy efficiency campaigns.<sup>viii</sup>

The WBCSD project had a long-term focus – how to achieve a 60 percent global reduction in the amount of energy consumed in buildings by 2050. But with rising energy prices and near-term urbanization pressures the global economy needs energy efficiency investments today. Drawing on the unique buildings technology database developed for the WBCSD project, UTC set out to identify what it would take to reduce the amount of energy consumed in all buildings globally by 25 percent over the coming 25 years – a goal that’s achievable with current technology.

We found that improving global building efficiency by 25 percent by 2035 would create a \$2.6 trillion market for energy efficient building design and technology. Some of this investment (\$1 trillion) would occur in developed countries as the US, Europe and Japan retrofit existing homes and office buildings (Figure 2). But the majority (\$1.6 trillion) would take place in developing countries as they seek to improve the efficiency of future building stock. China and India in particular will be leading markets for energy efficient building technology and design in the years ahead.

**Figure 2: The Global Market Opportunity**

Investment required to deliver a 25 percent improvement in building efficiency by 2035 (\$bn)



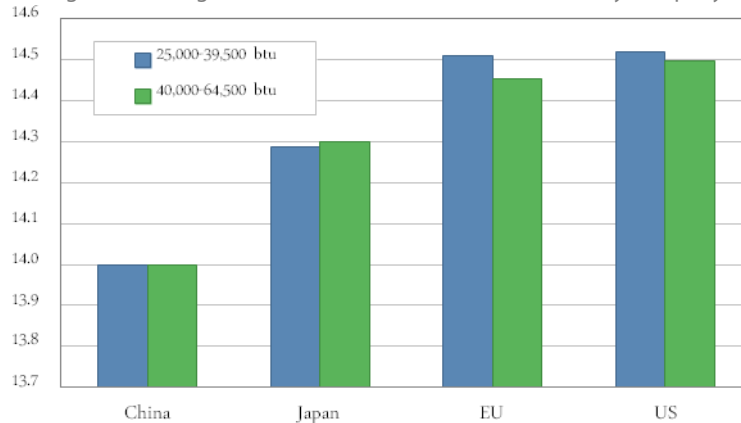
Source: Rhodium Group estimates based on IEA energy projections

## Leveraging America’s Efficiency Advantage

Thanks to past US energy efficiency policies, American business is in a strong position to compete in the global building efficiency market. The US has been an energy efficiency policy innovator, whether in building codes, appliance standards, labeling programs or research and development investments. By creating local demand for energy efficient building technology, these policies have given American companies a first-mover-advantage in global markets. As shown in Figure 3, while all companies selling equipment into the US market must comply with domestic energy efficiency standards, US companies produce the most energy efficient options available (in this case commercial air conditioning systems). And when compared to the products sold in other markets with less stringent standards, American companies have an even larger efficiency edge.

Figure 3: America's Energy Efficiency Edge

Average SEER rating for commercial AC units sold in the US by company location\*



Source: AHRI and Rhodium Group estimates. \* Companies are grouped by the country in which the manufacturer's parent company is located, which is not necessarily where the product is manufactured.

The take-away for the US is this: smart building efficiency policy at home not only saves American households and businesses money, but makes US companies and workers more competitive internationally. And supporting efforts by other countries to improve their efficiency policies in the years ahead will benefit those countries directly while creating new markets for American business.

<sup>i</sup> China's National Bureau of Statistics.

<sup>ii</sup> Defined as New York, New Jersey, Pennsylvania, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire and Maine.

<sup>iii</sup> McKinsey Global Institute, 2009, "Preparing for China's Urban Billion". Floor space estimates adjusted for construction completed since 2005, the reference year used in the McKinsey study, as reported by China's National Bureau of Statistics.

<sup>iv</sup> McKinsey Global Institute, 2010, "India's Urban Awakening: Building Inclusive Cities, Sustaining Economic Growth".

<sup>v</sup> World Bank's World Development Indicators.

<sup>vi</sup> Laurence Chandy and Geoffrey Gertz, 2011, "Poverty in Numbers: The Changing State of Global Poverty from 2005 to 2015", Washington: Brookings Institution.

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

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