

1) Is there a simple way to size the market for commercial retrofits in the US?

We define “commercial” as any building where >50% of floor space is neither residential, industrial, nor agricultural. Our definition includes private, public, and institutional buildings.

The market potential for commercial building retrofits in the U.S. is \$180-190 billion over the next ten years, or roughly **\$18 billion annually**.

Assumptions

- **72 billion square feet** of existing commercial building stock in the U.S in 2003 for which annual energy expenditure was more than \$93 billion.¹ Today that annual expenditure likely exceeds **\$100 billion** (\$1.40/sf)
- **22%** achievable energy savings potential on average across the entire stock of existing commercial buildings.² Potential savings at any one site may range from 5% to 60% depending on building age, type, design, prior retrofits, etc
- **Ten years** to capture the full opportunity (10% of the potential each year). This doesn't mean that 10% of entire building stock is renovated each year. More likely a smaller fraction of buildings retrofit with savings deeper than 20%
- Average ESCO retrofit cost of **\$2.50** per square foot³ (**8:1** cost/savings ratio)

Method 1: \$100B * 22% * 8:1 / 10 years = **\$17.6 billion/year**

Method 2: 72 billion sf * \$2.50/sf / 10 years = **\$18.0 billion/year**

¹ U.S. Energy Information Administration (2008). "Commercial Building Energy Consumption Survey (CBECS) " Washington, DC: US Department of Energy.

² Nadel, S., A. Shipley, et al. (2004). Technical, Economic, and Achievable Energy Efficiency Potential for US - A Meta-Analysis of Recent Studies., Washington, DC. American Council for an Energy Efficiency Economy (ACEEE). Meta-analysis found median achievable potential of 22% in the commercial building sector. By definition, “achievable potential” is less than “economic potential” which is less than “technical potential.” Achievable potential constrained by physical time delays in adoption/diffusion and capacity building.

³ Goldman, C., N. Hopper, et al. (2005). "Review of U.S. ESCO Industry Market Trends: An Empirical Analysis of Project Data." Berkeley, CA: Lawrence Berkeley National Lab.

Implications

Incremental market growth. The current market for energy retrofits in the U.S. is \$6 billion/ year⁴, dominated by public and institutional facilities. Therefore we're projecting incremental growth of **\$12 billion/year** in commercial energy service retrofits.

Jobs created. Energy efficiency investments are expected to result in 5 direct jobs, 5 indirect jobs, and 10 induced jobs for every million dollars invested.⁵ The \$18 billion annual investment for commercial building retrofits translates to **360,000 jobs**

GHG avoided. Based on national average commercial building fuel mixes and electricity emission factors, the greenhouse gases avoided as result of this program would reach **142 million metric tons of carbon dioxide**. This is equivalent to the emissions of **31 coal-fired power plants**.

Current emissions from U.S. commercial building sector are 646 million tonnes CO₂e/year and under a business as usual scenario EIA expects them to rise to 1.26 billion tonnes CO₂e/year.⁶ The additional 614 MTCO₂e is projected to result from a large expected increase in commercial space (73 to 108 billion sq feet) and greater reliance on electricity (51% to 57%) between 2005 and 2030.

Total EE Market

According to the American Council for an Energy Efficiency Economy (ACEEE), \$51 billion in total energy efficiency investments are estimated to have been made in commercial buildings during 2004, including \$7.7 billion in premium investments.⁷

- The premium is the incremental difference in the investment costs associated with efficient versus inefficient goods and services. 15% of total investment for the sector.
- \$51B includes all investments made both in building new, energy-efficient structures and in renovating old structures in ways that make them more efficient.
- Does not include investments in appliances and electronics, another estimated ~\$88B across commercial and residential sectors.
- Renovations include the installation of lighting, HVAC, and building envelope materials that improve energy efficiency.

⁴ Frost and Sullivan (2008). "North American Energy Management Services - Investment Analysis." Report # N337-F1.

⁵ Based on construction industry economic multipliers generated by the Regional Input-Output Modeling system (RIMS) from the Bureau of Economic Analysis, a bureau of the U.S. Department of Commerce

⁶ U.S. EIA (2008) Annual Energy Outlook "Reference Case"

⁷ Ehrhardt-Martinez, K. and S. Laitner (2008). "The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture." Washington, DC: American Council for an Energy Efficient Economy (ACEEE). Report Number E083.