Analysis of Job Creation and Energy Cost Savings From Building Energy Rating and Disclosure Policy

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Introduction

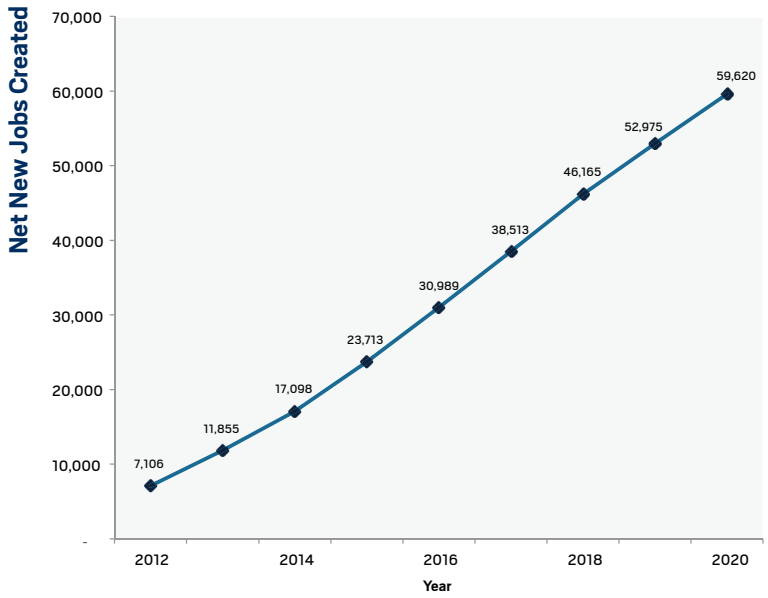
State and local governments are seeking to leverage greater building energy-performance transparency to motivate energy efficiency improvements in existing buildings. Major cities and states, including New York City, San Francisco, the District of Columbia, and California, now require building owners and operators to comparatively rate the energy performance of their buildings and disclose building energy-performance indicators to the marketplace. Existing policies are projected to impact more than 4 billion square feet of floor space annually by 2014, and similar policies are being considered in more than 10 other states and local jurisdictions.[1]

The Institute for Market Transformation (IMT) advises state and local governments and federal agencies on the design and implementation of building energy transparency policies and programs.

Summary of Results

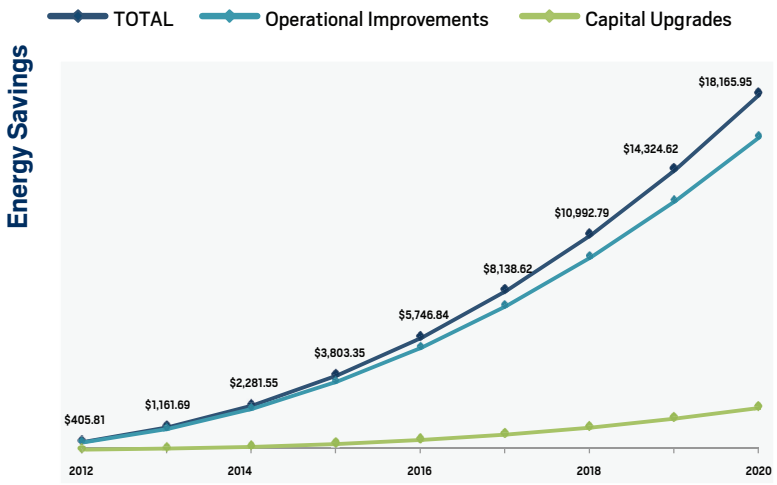
This study analyzes the potential of a national building energy rating and disclosure policy to create jobs and reduce energy-related expenditures in commercial and multifamily residential buildings. The analysis predicts such a policy would yield the following results:

Figure 1. Annual Employment Estimates



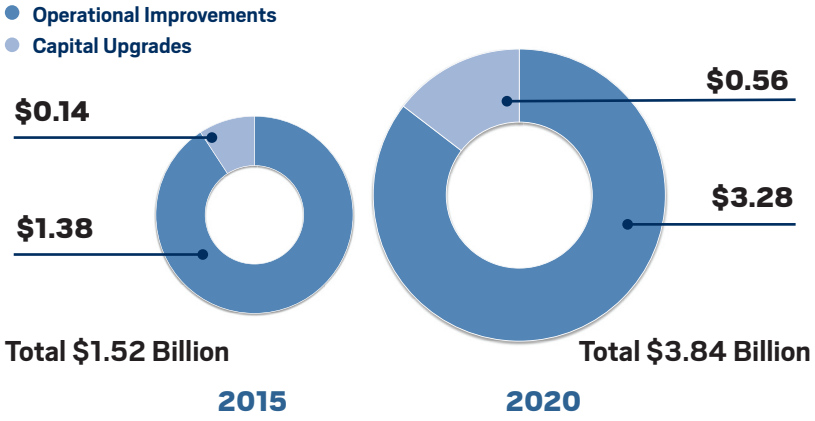
[1] Institute for Market Transformation. "Building Energy Transparency: A Framework for Implementing U.S. Commercial Energy Rating and Disclosure Policy." July 2011.
Available at http://www.buildingrating.org/Building_Energy_Transparency_Implementation_Report

Figure 2. Cumulative Energy Savings (Million $)



- Create more than 23,000 net new jobs in 2015 and more than 59,000 jobs in 2020, resulting from increased demand for energy efficiency services and technologies, and from the reinvestment of energy cost savings by consumers and businesses into the economy.[2]
- Reduce energy costs for building owners, consumers, and businesses by approximately $3.8 billion through 2015 and more than $18 billion through 2020.
- Generate more than $7.8 billion in private investment in energy efficiency measures through 2020, yielding $3 to $4 in energy cost savings for every dollar invested.
- Reduce annual energy consumption in the U.S. building sector by approximately 0.2 quadrillion Btus by 2020, equal to taking more than 3 million cars off the road each year.[3]

Figure 3. Annual Energy Savings From Operational Improvements and Capital Upgrades (Billions)



[2] More than 60% of the net jobs created are associated with the energy bill savings for consumers and businesses. The re-spending of energy savings directs economic activity away from the energy supply industry, which supports very few workers per dollar received, toward other, more labor-intensive sectors of the economy.

[3] A typical passenger car with an average fuel economy of 24 mpg, driven 12,000 miles/year uses 500 gallons of gasoline/year, or about 62.5 million Btus.

Employment estimates were developed by the Political Economy Research Institute (PERI) using energy savings projections developed jointly by IMT and an advisory panel of industry and academic experts.[4] A detailed explanation of these analyses, methodologies, and results can be found in the appendix.

Rating and Disclosure as a Policy Tool

Rating and disclosing the energy performance of buildings can help overcome barriers that constrict private investment in building energy efficiency improvements. Those barriers include:

- Lack of awareness by building owners about energy performance improvement opportunities: Many building owners and operators lack knowledge about the energy performance and historical energy consumption trends of their buildings. Energy rating is an established best practice that helps owners and operators track building energy performance, assess energy efficiency investment opportunities, and manage and control energy consumption and related costs.[5]
- Lack of energy performance recognition in the marketplace: Standardized building energy performance information is not widely available to tenants, prospective lessees, investors, lenders, appraisers, and other real estate stakeholders. Making this information more accessible enables the market to factor energy performance into real estate leasing and investment decisions, facilitating demand for energy-efficient buildings and competition to improve energy performance.

Assessing the Potential Energy Savings From Rating and Disclosure Policy

To conduct this analysis, IMT assumed the following basic policy requirements, applied nationally:

- Annual energy rating for commercial buildings 25,000 square feet and greater in size;
- Annual energy rating for multifamily residential buildings 20 units and greater in size; and
- Annual public disclosure of building energy ratings.

These requirements are similar to the existing policy requirements in a number of large U.S. cities. At the present time, none of these policies has been in force for a period long enough to conduct a thorough analysis.

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[4] See page 5

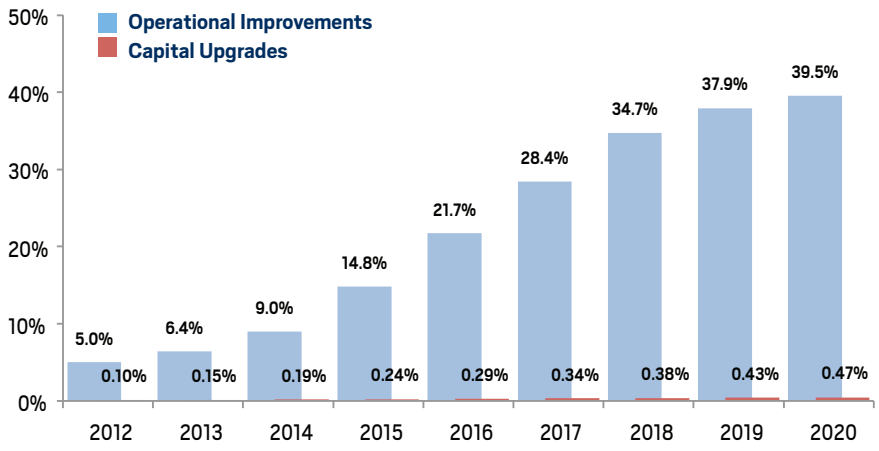
[5] The 2011 "Energy Efficiency Indicator" survey of global executives and building owners responsible for real estate energy management and investment decisions found that organizations are more likely to improve building energy performance if they measure and analyze energy usage data on at least a monthly basis. The survey was conducted by the Johnson Controls Institute for Building Efficiency in partnership with the International Facility Management Association and the Urban Land Institute and is available at: http://www.institutebe.com/Energy-Efficiency-Indicator/2011-global-results.aspx

A survey published by Building Operating Management in Dec. 2011 of hundreds of facilities managers who use the U.S. Environmental Protection Agency's ENERGY STAR energy assessment tool found that 70 percent of respondents used the resulting energy-performance information to "guide energy efficiency upgrade plans," and 67 percent used it to "help justify an energy efficiency project." For more information, please see: http://www.facilitiesnet.com/powercommunication/article/Careful-Assessment-of-Energy-Options-Can-Show-What-Steps-to-Take--12849

This analysis was conducted using the following key assumptions:

- Low-cost energy efficiency improvements in building operations account for most energy savings. Operational improvements account for the majority of energy savings catalyzed by rating and disclosure policy, consistent with experience from voluntary energy rating programs. Capital upgrades account for only 5 percent of energy savings in 2012 and less than 15 percent of savings in 2020.
- Most operational improvements are inexpensive and result in limited annual energy savings. The majority of buildings that conduct operational improvements will save less than 5 percent of baseline energy consumption annually.
- The policy will motivate energy performance improvements in a greater share of buildings over time. The policy will galvanize long-term market transformation and become more effective at motivating energy performance improvements as buildings are rated in consecutive years and as disclosure cultivates market-based demand and competition for energy-efficient buildings. However, the policy will not motivate energy performance improvements in a sizeable portion of the buildings that it covers.

Figure 4. Annual Percentage of Covered Buildings That Improve Energy Performance



About the Advisory Panel

IMT convened an advisory panel of experts in the fields of commercial real estate and energy efficiency to guide the development of energy impact assumptions for this analysis.[6] The advisory panel included the following individuals:

- Lane Burt, U.S. Green Building Council
- Lisa Colicchio, CB Richard Ellis
- Constantine Kontokosta, New York University Schack Institute of Real Estate
- Jim Landau, Bentall Kennedy
- Brian McCarter, Sustainable Real Estate Solutions
- Jeffrey Perlman, Bright Power
- Dan Probst, Jones Lang LaSalle
- Nicholas Stolatis, TIAA-CREF
- Meg Waltner, Natural Resources Defense Council
- Mike Williams, EnergyPrint

[6] The views and opinions expressed in this report are the sole responsibility of IMT, members of the advisory panel, and PERI, and do not necessarily represent the views and opinions of any company or organization affiliated with a member of the advisory panel or otherwise mentioned in this report.

Employment Estimates of a Benchmarking Policy for Building Energy Efficiency

TABLES AND METHODOLOGY

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Introduction

This appendix presents employment estimates and methodology for energy efficiency upgrades of multifamily residential buildings and commercial buildings. The Institute for Market Transformation has provided PERI with forecasts of the effects of implementing a benchmarking and disclosure program for the energy usage of these types of buildings. Using data and assumptions provided by IMT, we estimate the employment impacts of three outcomes of this program:

- Employment from operational improvements;
- Employment created as energy savings are realized and spending portfolios shift away from energy goods;
- Employment from the manufacture and installation of various energy-efficient technologies.

Methodology

Employment Estimating Methodology

The employment estimates in this report are derived from an input-output model. The input-output (I-O) model allows us to observe relationships between different industries in the production of goods and services. We can also observe relationships between consumers of goods and services, including households and governments, and the various producing industries. For our purposes, the input-output modeling approach enables us to estimate the effects on employment resulting from spending on operational improvements and capital upgrades to buildings.

For example, we can estimate the number of jobs directly created in manufacturing and installing energy-efficient windows. We can also estimate the jobs that are indirectly created in other industries that supply goods and services to these industries, such as the employment created in glass production and trucking. Overall, the input-output model allows us to estimate the economy-wide employment results of a change in spending.

The I-O model we use in this analysis is the IMPLAN version 3 model from the Minnesota IMPLAN Group, Inc. with the 2009 national U.S. data set. The IMPLAN model uses data from the Commerce Department's Bureau of Economic Analysis as well as additional data sources to

compile input-output accounts of 440 industries. Using IMPLAN we estimate the direct and indirect employment effects of a benchmarking and disclosure program to make buildings more energy efficient. In addition to the direct and indirect employment we calculate induced job creation. Induced employment is the result when workers in the direct and indirect industries spend their earnings, which increases demand in industries such as retail, healthcare, and food services. For this analysis, we use an induced multiplier of 0.40. Once we estimate the combined impact of the direct and indirect employment using IMPLAN, we multiply this by 40 percent to estimate the level of induced employment.

Industry Composition

In this analysis we estimate the employment created by investments in operational and capital upgrades to multifamily buildings and commercial buildings. These upgrades entail costs to purchase and install energy-efficient equipment and to improve building operations. They also yield the benefit of reduced spending on energy bills. As these energy savings are re-spent throughout the economy, jobs in the energy sector will fall while jobs in non-energy industries will grow. The sources, assumptions, and industry composition used to estimate employment from operational improvements, capital upgrades, and shifting spending patterns are presented here.

1. Operational Expenditures

This category is the same for both multifamily and commercial buildings. It is composed of 80 percent "Facility Support Services" and 20 percent "Environmental Controls." These industries and weights were provided by IMT. Estimated distribution of project costs and savings is shown in the table below.

Table 1. Distribution of Energy Savings and Project Costs for Operational Improvements [7]

Commercial Buildings 25,000 - 100,000 sq ft, Multifamily Buildings

Energy Savings	Distribution	Cost/Sq Ft
1-4%	50%	$0.01
5-9%	30%	$0.04
10-14%	10%	$0.10
15-19%	5%	$0.15
20-24%	2%	$0.15
25-29%	2%	$0.15
30% or more	1%	$0.15
Weighted Ave	**6.4%**	**$0.04**

Commercial Buildings over 100,000 sq ft

Energy Savings	Distribution	Cost/Sq Ft
1-4%	60%	$0.01
5-9%	35%	$0.03
10-14%	2%	$0.07
15-19%	1%	$0.10
20-24%	1%	$0.10
25% or more	1%	$0.10
Weighted Ave	**4.6%**	**$0.02**

[7] Data provided to PERI by IMT and derived from a 2009 LBNL report of the median costs and whole-building energy savings for existing building commissioning (Evan Mills, 2009, Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions, Report, Lawrence Berkeley National Laboratory, http://cx.lbl.gov/documents/2009-assessment/LBNL-Cx-Cost-Benefit.pdf.)

2. Capital Upgrades

Much of the energy savings in multifamily and commercial buildings is the result of capital upgrades. These include various technologies and manufactured goods that create employment both in the manufacturing sector as well as in the construction sector as equipment is installed. While the capital upgrades of multifamily and commercial buildings share some similarities, there are differences, and therefore we model each separately. The categories and weights for residential buildings were provided by IMT.

For commercial buildings, the categories and weights were developed using information from the U.S. Green Building Council as well as the January 2005 "Review of U.S. ESCO Industry Market Trends" by Lawrence Berkeley National Laboratory, the Building STAR Survey Results from the Real Estate Roundtable, and the February 2011 report "Deep Savings in Existing Buildings" by the New Buildings Institute for the Northwest Energy Efficiency Alliance.

The table below shows the capital upgrade categories, their weights within the total package of efficiency measures for each building type, and the portion of the spending on each technology group that is attributable to the production and installation of the efficiency upgrade.

Table 2. Industry Composition and Weights for Capital Upgrades

Multifamily Capital Upgrades		
Technology Group	**Weight**	**Description**
Lighting	0.1	70% Lighting manufacture, 30% installation
HVAC	0.25	24% air purification and ventilation equipment, 23% heating equipment, 23% air conditioning and refrigeration equipment, 30% installation
Water Heating	0.15	35% power boilers, 35% water heaters (except boilers), 30% installation
Appliance Upgrades	0.15	52.5% household refrigerators and freezers, 17.5% household laundry appliances, 30% installation
Environmental Controls	0.05	70% Environmental Controls, 30% installation
Envelope Improvements	0.3	10% windows, 4% insulation, 2% asphalt shingles, 2% weather stripping, 2% paint and coatings, 80% installation
Commercial Capital Upgrades		
Technology Group	**Weight**	**Description**
Lighting	0.25	70% Lighting manufacture, 30% installation
HVAC	0.20	24% air purification and ventilation equipment, 23% heating equipment, 23% air conditioning and refrigeration equipment, 30% installation
Motors and Drives	0.11	70% motor and generator manufacturing, 30% installation
Water Heating	0.09	35% power boilers, 35% water heaters (except boilers), 30% installation
Office Equipment	0.03	28% photocopying equipment, 28% computer equipment, 7% telephone apparatus, 7% other communications equipment, 30% installation
Environmental Controls	0.26	70% automatic environmental controls manufacturing, 30% installation
Envelope Improvements	0.06	8% window manufacturing, 8% insulation, 2% roofing materials, 2% painting and coating materials, 80% installation

Estimated distribution of project costs and savings shown in table below.

Table 3. Distribution of Energy Savings and Project Costs for Capital Upgrades – All Sectors[8]

Energy Savings	Distribution	Cost/Sq Ft
5-9%	20%	$1.00
10-14%	25%	$1.50
15-19%	20%	$2.75
20-24%	15%	$3.25
25-29%	10%	$3.75
30-34%	6%	$4.25
35-39%	3%	$4.75
40% or more	1%	$6.00
Weighted Average	**18%**	**$2.45**

3. Spending Shift From Energy to Non-Energy Goods and Services

3a. Employment From Energy Spending

Operational expenditures and capital upgrades will both lead to energy savings which in turn will reduce the amount of spending on energy. IMT has estimated the potential energy savings both in units of energy and in dollar terms from this benchmarking and disclosure program. In order to calculate the net job impacts of these energy savings, we first calculate the number of jobs that would be maintained in the absence of the program, which is the employment related to energy spending. IMT calculates that the energy savings in multifamily buildings will be 63 percent electricity savings and 37 percent natural gas and liquid fuels. Commercial building savings are 75 percent electricity and 25 percent natural gas and liquid fuels. Using IMPLAN, we calculate the employment impacts of demand for electricity, and for natural gas and liquid fuels, for each type of building based on these proportions.

3b. Employment From Spending Equivalent Amount on Non-Energy Sectors

We then calculate the jobs that would be created if energy spending were channeled to non-energy spending in the same proportion that building owners and tenants currently spend on non-energy goods and services. In order to perform this second step, we use data from the Census and inputs from IMT to determine who will realize the savings in energy expenditures. IMT suggests that 75 percent of the savings will accrue to building owners and 25 percent to tenants. In multifamily buildings, we use the Property Owners and Managers Survey (POMS) from the U.S. Census Bureau to determine the type of ownership.[9] To align the sources of demand in our model to the survey findings, we assign 70 percent of multifamily ownership to high-income

[8] http://www.census.gov/hhes/www/housing/poms/multifam/mfowner/mftab96.html

[9] http://www.census.gov/hhes/www/cpstables/032011/hhinc/new01_001.htm

households (incomes greater than $150,000 per year) and 30 percent to Real Estate Establishments. The tenants of multifamily buildings, we find from the Census's "Current Population Survey," are households with a median income of approximately $31,000.[10] Within the model we select this income category of households as tenants.

For commercial buildings we assign 100 percent of ownership to Real Estate Establishments. Tenancy of commercial buildings, however, is fairly diverse. We calculate a weighted average of the expenditures of various types of commercial building tenants using data from IMT, which in turn is based on the 2003 Commercial Buildings Energy Consumption Survey of the U.S. Energy Information Administration. Our weighting for commercial tenancy, as modeled in IMPLAN, is:

14%	**Education**
2%	**Food Sales**
2%	**Food Service**
4%	**Healthcare**
7%	**Lodging**
16%	**Retail**
17%	**Offices**
5%	**Religious Organizations**
6%	**Social Advocacy Organizations**
14%	**Warehouse and Storage**
13%	**Other**

3c. Net Employment From a Shift in Spending From Energy to Non-Energy

Using the distribution of owners and tenants as described above, we calculate the employment created by a given amount of spending on all non-energy sectors, in the same proportion in which these owners and tenants currently spend (3b). We then subtract the employment that would be maintained by continued spending on energy (3a). This yields a net job creation figure.

[10] http://www.census.gov/hhes/www/cpstables/032011/hhinc/new01_001.htm

EMPLOYMENT MULTIPLIERS

The tables below present the employment multipliers for each of these three categories. The first table presents the multipliers for each $1 million of spending. Note that these estimates are derived from a linear model, therefore they can be scaled linearly. The estimates are presented as jobs per $1 million, but the estimates of jobs per $1 billion would simply be 1,000 times the figures below.

Table 4: Employment Estimates per $1 million in Expenditures, Operational Improvements

	Direct jobs per $1 million	Indirect jobs per $1 million	Induced jobs per $1 million	Total jobs per $1 million
Building operations	7.80	4.30	4.84	16.94
Environmental Controls	3.40	4.40	3.12	10.92
Weighted average from operational improvements (80% operations, 20% environmental controls)	6.92	4.32	4.50	15.74

Table 5: Employment Estimates per $1 million in Expenditures, Capital Upgrades

Multifamily Capital Upgrades	Direct jobs per $1 million	Indirect jobs per $1 million	Induced jobs per $1 million	Total jobs per $1 million
Lighting	4.82	4.24	3.62	12.68
HVAC	5.03	4.31	3.74	13.08
Water Heating	4.68	4.10	3.51	12.29
Appliance Upgrades	3.91	4.38	3.32	11.61
Environmental Controls	4.75	4.31	3.62	12.68
Envelope Improvements	6.98	4.10	4.43	15.51
Weighted Average, Multifamily	5.36	4.22	3.83	13.41
Commercial Capital Upgrades	**Direct jobs per $1 million**	**Indirect jobs per $1 million**	**Induced jobs per $1 million**	**Total jobs per $1 million**
Lighting	5.09	4.15	3.70	12.94
HVAC	5.30	4.22	3.81	13.33
Motors and Drives	4.53	3.94	3.39	11.86
Water Heating	4.95	4.08	3.61	12.64
Office Equipment	3.76	3.73	3.00	10.49
Environmental Controls	5.00	4.30	3.70	13.00
Envelope Improvements	7.70	3.90	4.70	16.30
Weighted Average, Commercial	5.12	4.12	3.69	12.94

Table 6: Employment Estimates per $1 million, Energy Savings

Jobs supported by energy spending	Direct jobs per $1 million	Indirect jobs per $1 million	Induced jobs per $1 million	Total jobs per $1 million
Multifamily	1.20	2.60	1.52	5.32
Commercial	1.30	2.50	1.52	5.32
Jobs created through consumption of non-energy goods by building owners and tenants	**Direct jobs per $1 million**	**Indirect jobs per $1 million**	**Induced jobs per $1 million**	**Total jobs per $1 million**
Multifamily				
Owners - High-income individuals (70%)	7.50	3.50	4.40	15.40
Owners - Real estate firms (30%)	7.20	3.60	4.32	15.12
Tenants	7.00	3.60	4.24	14.84
Total (75% owner/25% tenant split)	7.31	3.55	4.34	15.20
Commercial				
Owners – Real estate firms	7.20	3.60	4.32	15.12
Tenants – Various types (see below)	7.00	3.50	4.20	14.70
Total (75% owner/25% tenant split)	**7.15**	**3.58**	**4.29**	**15.02**
Net difference in jobs by shifting from energy spending to non-energy spending (jobs created through energy savings)	**Direct jobs per $1 million**	**Indirect jobs per $1 million**	**Induced jobs per $1 million**	**Total jobs per $1 million**
Multifamily	6.11	0.95	2.82	9.88
Commercial	5.85	1.08	2.77	9.70

Energy Savings, Private Investment, and Employment

The following tables present the results of an IMT analysis of the estimated annual expenditures on efficiency measures and energy savings impacts in the U.S. The subsequent tables use the expenditure and savings estimates from IMT, along with the employment multipliers per $1 million (presented in tables 4-6) to show the total employment impacts over the period 2012-2035.

Table 7. Expenditures on and Energy Savings From Energy Efficiency Investments

(million $)	Capital Upgrade Expenditures	Operational Improvement Expenditures	Total Expenditures	Energy Savings From Capital Upgrades	Energy Savings From Operational Improvements	Total Energy Savings
Sum: 2012-2035	15,975	17,506	$33,481.23	$23,286.84	$71,819.82	$95,106.66
2012	$135.71	$89.40	$225.11	$21.26	$384.55	$405.81
2013	$205.48	$117.94	$323.42	$52.06	$703.81	$755.87
2014	$276.85	$167.88	$444.73	$92.27	$1,027.59	$1,119.86
2015	$350.32	$279.91	$630.23	$143.85	$1,377.95	$1,521.80
2016	$425.92	$419.85	$845.77	$205.46	$1,738.03	$1,943.49
2017	$499.26	$561.16	$1,060.42	$277.72	$2,114.06	$2,391.78
2018	$574.73	$700.19	$1,274.92	$360.13	$2,494.04	$2,854.17
2019	$652.02	$774.98	$1,427.00	$452.93	$2,878.90	$3,331.83
2020	$730.95	$818.25	$1,549.20	$558.68	$3,282.65	$3,841.33
2021	$740.30	$828.73	$1,569.03	$662.65	$3,330.67	$3,993.32
2022	$749.61	$839.17	$1,588.78	$767.33	$3,382.00	$4,149.33
2023	$759.01	$849.74	$1,608.75	$872.90	$3,436.54	$4,309.44
2024	$768.57	$860.49	$1,629.06	$979.96	$3,495.56	$4,475.51
2025	$778.28	$871.40	$1,649.68	$1,087.79	$3,556.01	$4,643.80
2026	$788.10	$882.44	$1,670.54	$1,195.45	$3,614.66	$4,810.10
2027	$797.99	$893.54	$1,691.53	$1,301.67	$3,668.47	$4,970.14
2028	$807.90	$904.67	$1,712.57	$1,408.19	$3,723.08	$5,131.27
2029	$817.81	$915.80	$1,733.61	$1,513.70	$3,775.35	$5,289.04
2030	$827.73	$926.96	$1,754.69	$1,615.34	$3,818.77	$5,434.12
2031	$837.71	$938.16	$1,775.87	$1,722.46	$3,875.80	$5,598.26
2032	$847.73	$949.41	$1,797.14	$1,831.72	$3,937.38	$5,769.10
2033	$857.75	$960.66	$1,818.41	$1,940.06	$3,996.91	$5,936.97
2034	$867.78	$971.92	$1,839.70	$2,052.05	$4,063.58	$6,115.63
2035	$877.85	$983.22	$1,861.07	$2,171.20	$4,143.45	$6,314.65

Note: Estimates of energy savings are from IMT analysis.

Table 8: Employment From Operational Improvements

	Multifamily		Commercial		Total
	Operational Improvement Expenditures (million $)	**Employment From Operational Improvements (# jobs)**	**Operational Improvement Expenditures (million $)**	**Employment From Operational Improvements (# jobs)**	**Total Employment From Operational Improvements (# jobs)**
Sum 2012-2035	$ 1,328.59	20,907	$ 16,177.28	254,566	275,472
2012	$ 11.09	175	$ 78.31	1,232	1,407
2013	$ 13.46	212	$ 104.48	1,644	1,856
2014	$ 18.09	285	$ 149.79	2,357	2,642
2015	$ 25.12	395	$ 254.79	4,009	4,405
2016	$ 34.59	544	$ 385.26	6,062	6,607
2017	$ 44.29	697	$ 516.87	8,133	8,830
2018	$ 51.90	817	$ 648.29	10,202	11,018
2019	$ 57.34	902	$ 717.64	11,293	12,195
2020	$ 60.51	952	$ 757.74	11,924	12,876
2021	$ 61.32	965	$ 767.41	12,076	13,041
2022	$ 62.13	978	$ 777.04	12,227	13,205
2023	$ 62.99	991	$ 786.75	12,380	13,371
2024	$ 63.88	1,005	$ 796.61	12,535	13,541
2025	$ 64.77	1,019	$ 806.63	12,693	13,712
2026	$ 65.67	1,033	$ 816.77	12,853	13,886
2027	$ 66.56	1,047	$ 826.98	13,013	14,061
2028	$ 67.46	1,062	$ 837.21	13,174	14,236
2029	$ 68.36	1,076	$ 847.44	13,335	14,411
2030	$ 69.27	1,090	$ 857.69	13,497	14,587
2031	$ 70.17	1,104	$ 867.99	13,659	14,763
2032	$ 71.07	1,118	$ 878.34	13,822	14,940
2033	$ 71.96	1,132	$ 888.70	13,985	15,117
2034	$ 72.85	1,146	$ 899.07	14,148	15,294
2035	$ 73.73	1,160	$ 909.49	14,312	15,472

Note: Total Employment in each category is operational expenditure level, from table 7 of this document, times the net employment multiplier for each category, from Table 4 in this document.

Table 9: Expenditures and Employment for Capital Upgrades

	Multifamily		Commercial		Total
	Capital Upgrade Expenditures (million $)	Employment From Capital Upgrade Expenditures (# jobs)	Capital Upgrade Expenditures (million $)	Employment From Capital Upgrade Expenditures (# jobs)	Total Employment From Capital Upgrade Expenditures (# jobs)
Sum 2012-2035	$ 665.51	8,924	$ 15,309.85	198,040	206,965
2012	$ 8.55	115	$ 127.16	1,645	1,760
2013	$ 12.96	174	$ 192.52	2,490	2,664
2014	$ 17.43	234	$ 259.42	3,356	3,589
2015	$ 22.00	295	$ 328.32	4,247	4,542
2016	$ 26.66	357	$ 399.26	5,165	5,522
2017	$ 26.95	361	$ 472.31	6,110	6,471
2018	$ 27.27	366	$ 547.46	7,082	7,447
2019	$ 27.62	370	$ 624.40	8,077	8,447
2020	$ 27.98	375	$ 702.97	9,093	9,469
2021	$ 28.36	380	$ 711.94	9,209	9,590
2022	$ 28.73	385	$ 720.88	9,325	9,710
2023	$ 29.13	391	$ 729.88	9,441	9,832
2024	$ 29.54	396	$ 739.03	9,560	9,956
2025	$ 29.95	402	$ 748.33	9,680	10,082
2026	$ 30.37	407	$ 757.73	9,802	10,209
2027	$ 30.78	413	$ 767.21	9,924	10,337
2028	$ 31.20	418	$ 776.70	10,047	10,465
2029	$ 31.61	424	$ 786.20	10,170	10,594
2030	$ 32.03	430	$ 795.70	10,293	10,722
2031	$ 32.45	435	$ 805.26	10,416	10,852
2032	$ 32.87	441	$ 814.86	10,541	10,981
2033	$ 33.28	446	$ 824.47	10,665	11,111
2034	$ 33.69	452	$ 834.09	10,789	11,241
2035	$ 34.10	457	$ 843.75	10,914	11,372

Note: Total Employment in each category is capital expenditure level, from table 7 of this document, times the net employment multiplier for each category, from Table 5 in this document.

Table 10: Savings and Employment From Reduced Energy Expenditures

	Multifamily		Commercial		Total
	Energy Savings (million $)	**Employment From Energy Savings (# jobs)**	**Energy Savings (million $)**	**Employment From Energy Savings (# jobs)**	**Employment From Energy Savings (# jobs)**
Sum 2012-2035	$ 4,450.36	43,956	$ 90,656.30	878,913	922,869
2012	$ 27.44	271	$ 378.37	3,668	3,939
2013	$ 38.33	379	$ 717.54	6,957	7,335
2014	$ 52.72	521	$ 1,067.14	10,346	10,867
2015	$ 73.93	730	$ 1,447.87	14,037	14,767
2016	$ 101.93	1,007	$ 1,841.56	17,854	18,861
2017	$ 130.19	1,286	$ 2,261.59	21,926	23,212
2018	$ 153.08	1,512	$ 2,701.09	26,187	27,699
2019	$ 170.46	1,684	$ 3,161.37	30,650	32,333
2020	$ 182.88	1,806	$ 3,658.45	35,469	37,275
2021	$ 188.57	1,862	$ 3,804.75	36,887	38,750
2022	$ 194.75	1,924	$ 3,954.58	38,340	40,263
2023	$ 201.05	1,986	$ 4,108.39	39,831	41,817
2024	$ 208.16	2,056	$ 4,267.35	41,372	43,428
2025	$ 214.53	2,119	$ 4,429.27	42,942	45,061
2026	$ 221.29	2,186	$ 4,588.81	44,489	46,674
2027	$ 228.08	2,253	$ 4,742.06	45,974	48,227
2028	$ 235.15	2,323	$ 4,896.12	47,468	49,790
2029	$ 241.12	2,382	$ 5,047.92	48,940	51,321
2030	$ 247.04	2,440	$ 5,187.08	50,289	52,729
2031	$ 253.72	2,506	$ 5,344.54	51,815	54,321
2032	$ 261.07	2,579	$ 5,508.03	53,400	55,979
2033	$ 267.41	2,641	$ 5,669.56	54,966	57,608
2034	$ 274.71	2,713	$ 5,840.92	56,628	59,341
2035	$ 282.72	2,792	$ 6,031.93	58,480	61,272

Note: Total Employment in each category is savings level, from table 7 of this document, times the net employment multiplier for each category, from Table 6 in this document.

About the Institute for Market Transformation

The Institute for Market Transformation (IMT) is a Washington, DC-based nonprofit organization promoting energy efficiency, green building, and environmental protection in the United States and abroad. IMT's work addresses market failures that inhibit investment in energy efficiency and sustainability in the building sector.

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