U.S. GREEN BUILDING COUNCIL

GREEN JOBS STUDY

PREPARED FOR

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Executive Summary

To better understand the domestic job potential from green buildings, the U.S. Green Building Council (USGBC) asked Booz Allen to estimate the number of jobs associated with the green building market. Recent articles and studies have tried to estimate the number of "green collar jobs" that will be created from various national energy proposals, but few studies have focused exclusively on green building employment opportunities. This study contributes to this effort by calculating the number of jobs supported by the total green building construction market. The study also estimates the number of jobs that can be attributed to USGBC as a result of developing the LEED rating system.

The results of this study show that the economic impact from green building construction is significant and will continue to grow as the demand for green buildings rises. Green construction spending currently supports over 2 million jobs and generates over 100 billion dollars in gross domestic product and wages. By the year 2013, this study estimates that green buildings will support nearly 8 million jobs across occupations ranging from construction managers and carpenters to truck drivers and cost estimators. USGBC also supports job creation and economic activity. LEED-related spending has already generated 15,000 jobs since 2000, and by 2013 this study forecasts that an additional 230,000 jobs will be created.

Green Construction Economic Impact

From 2000–2008, the green construction market has:

- Generated $173 billion dollars in GDP
- Supported over 2.4 million jobs
- Provided $123 billion dollars in labor earnings

From 2009–2013, this study forecasts that green construction will:

- Generate an additional $554 billion dollars in GDP
- Support over 7.9 million jobs
- Provide $396 billion in labor earnings

USGBC Economic Impact

Between 2000–2008, LEED related construction spending has:

- Generated $830 million in GDP
- Supported 15,000 jobs
- Provided $703 million in labor earnings

Between 2009–2013, we forecast that LEED related spending will:

- Generate an additional $12.5 billion dollars in GDP
- Support 230,000 jobs
- Provide $10.7 billion in labor earnings

1. Introduction

Buildings generate approximately 40 percent of the United States' carbon emissions. Under a likely carbon-constrained future, the construction of more environmentally friendly buildings and the renovation of existing buildings will play a critical role in reducing these emissions. The green building market is growing dramatically. McGraw Hill estimates that the total value of green construction was $10 billion in 2005, and that value grew to between $36 and $49 billion by 2008. By 2013, it estimates that the market could grow to as much as $96–140 billion.

Local and national policymakers increasingly view green construction and renovation activities as an opportunity to spur domestic job creation because these jobs cannot be outsourced to other countries and require workers with new and traditional skills. To better understand the domestic job potential from green buildings, the U.S. Green Building Council (USGBC) asked Booz Allen to estimate the number of jobs associated with this market. Recent newspaper articles and studies have tried to estimate the total number of "green collar jobs" that will be created from various national energy proposals, but few studies have focused exclusively on green building employment opportunities. This study contributes to this effort by calculating the number of jobs created by the green building construction market between 2000 and 2008. It also forecasts the number of jobs that will be created from 2009–2013 based on estimates published by McGraw Hill and our own projections of the demand for LEED certified buildings.

The term "green jobs" or "green collar jobs" is not well-defined. There are some professions that should be clearly considered green jobs, such as wind turbine manufacturers or green building designers. However, other traditional jobs such as electricians have been "upskilled" to take advantage of new technologies, such as learning how to install rooftop solar photovoltaic units. It is reasonable to consider both types of jobs as green jobs. However, this study does not have sufficient data to delineate between green and traditional jobs; it is only able to calculate the total number of jobs created as a result of green building investment. Therefore, this study estimates two sets of numbers in this report, which creates a range of employment values to help frame the magnitude of economic impact resulting from green buildings.

First, the study estimates all jobs supported by green construction expenditures. Under this approach, the study considers the total value of a green building, not just the share of expenditures that can be traced to green technologies or processes. This employment estimate will therefore include workers from the architects who designed the building to the construction laborers who poured the building's foundation. This broad and inclusive estimate of employment is useful because the demand for green buildings has created opportunities for many types of professions.

Second, the study estimates the jobs created as a direct result of the LEED rating system. To do this, we conducted an analysis of 10 reports and studies covering 69 LEED-certified buildings. From these reports, we derived average LEED-related expenditures, including both hard and soft costs. Hard costs consist of expenditures on equipment whereas soft costs refer to design and consulting costs. Because all expenditures under this approach are LEED related, it is reasonable to assume that the vast majority of these jobs could be considered green jobs and that USGBC can take credit for creating them.

Booz Allen used a macroeconomic modeling tool, IMPLAN, to calculate the total number of direct, indirect, and induced jobs created from green building expenditures. The tool also calculates the direct, indirect, and induced effects on gross domestic product (GDP) and labor earnings. *Direct effects* are the

initial economic changes to the industry impacted (e.g., a general contractor who constructs a green building). *Indirect effects* represent the increased economic activity generated for downstream businesses that provide supplies and raw materials for the industries directly affected (e.g., the general contractor purchases supplies from steel and lumber companies). Finally, *induced effects* capture the economic impact from the increased income of households that are directly and indirectly affected by green building expenditures (e.g., employees of the general contractor, the steel supplier, and the lumber supplier use their additional income from green construction spending to purchase products and services from food and gas to healthcare and education).

This report is divided into five sections. Section 2 estimates the economic impact resulting from the total green construction market. The total value of green construction is included under this approach. Section 3 estimates the economic impact resulting from LEED-related expenditures for all LEED-certified buildings. Section 4 examines the types of jobs created as a result of green building spending, the average salaries for these positions, and the estimated educational attainment required for each position. Section 5 estimates the energy savings and environmental benefits for the total green construction market and for LEED-certified buildings. Section 6 summarizes the study's conclusions.

2. Green Construction Economic Impact

The green construction market has grown dramatically since 2000, and it is forecasted to continue to grow, despite an expected decline in the overall construction market. As building owners select more environmentally friendly designs for their buildings, the demand for "green" services will continue to rise. Similarly, owners are aggressively retrofitting buildings in their existing portfolio to take advantage of reduced operating costs and to maintain or increase the value of their property. While the growth in the green construction market is dramatic, the economic impact of this growth in terms of GDP, jobs, and wages is not well known.

This section summarizes how this study estimates the economic impact of the green construction market. Under this approach, the study estimates the economic impact resulting from the total value of green buildings, not just the spending related to green technologies, because the demand for green buildings creates employment opportunities for dozens of professions within the construction industry. This study uses McGraw Hill's definition for the green construction market, which includes both LEED-certified buildings and non-LEED-certified high-performance green buildings. This section also estimates the savings that result from green buildings, as reduced operational expenditures (e.g., electricity savings) will reduce economic activity in some industry sectors.

McGraw Hill's "Green Construction Market" Definition:
"We define green building as one built to LEED standards, an equivalent green building certification program, or one that incorporates numerous green building elements across five category areas: energy efficiency, water efficiency, resource efficiency, responsible site management and improved indoor air quality. Projects that only feature a few green building products (e.g., HVAC systems, waterless urinals) or that only address one aspect of a green building, such as energy efficiency, are not included in this calculation."

Source: McGraw Hill, 2008 Green Construction Outlook Report

Approach

In this section, the study calculates job creation based on the total value of green building construction. McGraw Hill produced estimates for the value of the green construction market for the years 2005, 2008, and 2013. Based on these three data points, Booz Allen estimated the green construction market value for the intervening years (2000–2013) by selecting the annual growth rates required to meet McGraw Hill's estimates.

Booz Allen calculated the savings that result from green buildings based on data from a meta-analysis of 10 reports on LEED-certified buildings. The study then calculated the estimated savings per square foot for four savings categories: energy, operations and maintenance (O&M), trash, and water. Based on these analyses, the study calculated the following average savings per square foot:

- Energy: $0.52 /sq. ft.
- O&M: $0.32 / sq. ft.

- Trash: $0.05 / sq. ft.
- Water: $0.02 / sq. ft.

Further details on the meta-analysis can be found in Appendix B. To calculate annual savings, the study multiplied the savings per square foot for each category by the cumulative number of square feet of green building stock. Exhibit 2-1 displays the estimated green construction market spending and savings by category for the period 2000–2013.

Exhibit 2-1: Green Construction Market Value (in Millions 2003$)

				Savings by category (Millions 2003$)			
Year	Construction Value *(Millions 2008$)*	Annual Square Feet	Cumulative Square Feet	Energy *($0.52/sqft)*	O&M *($0.32/sqft)*	Trash *($0.05/sqft)*	Water *($0.02/sqft)*
2000	$4,571	31,567,620	31,567,620	$(16)	(10)	$(1)	$(2)
2001	$5,228	36,106,714	67,674,335	$(35)	(22)	$(1)	$(4)
2002	$5,810	40,127,861	107,802,195	$(55)	(35)	$(2)	$(6)
2003	$6,745	46,583,198	154,385,394	$(79)	(50)	$(3)	$(8)
2004	$8,242	56,918,664	211,304,058	$(108)	(68)	$(4)	$(12)
2005	$10,028	69,257,792	280,561,849	$(144)	(90)	$(6)	$(15)
2006	$17,464	120,613,170	401,175,019	$(205)	(129)	$(8)	$(22)
2007	$28,180	194,616,261	595,791,280	$(305)	(191)	$(13)	$(33)
2008	$41,921	289,512,209	885,303,489	$(453)	(284)	$(19)	$(48)
2009	$51,814	357,837,090	1,243,140,580	$(636)	(399)	$(26)	$(68)
2010	$64,042	442,286,644	1,685,427,223	$(862)	(541)	$(36)	$(92)
2011	$79,156	546,666,291	2,232,093,515	$(1,142)	(716)	$(47)	$(122)
2012	$97,837	675,679,536	2,907,773,051	$(1,487)	(933)	$(61)	$(159)
2013	$120,926	835,139,907	3,742,912,958	$(1,915)	(1,200)	$(79)	$(204)

Assumptions

We made several assumptions given the available data:

- McGraw Hill's definition of the green construction market includes the total value of the building, not just the incremental value attributable to environmentally friendly equipment. Therefore, the economic and employment impact of these investments will capture both "green jobs," such as solar power array installers, and traditional construction jobs, such as welders and masons who are applying their traditional skills to a green building.
- McGraw Hill issues periodic forecasts for the total value of the green construction market, but it does not estimate the number of square feet of building space associated with those estimates. Therefore, we calculated the approximate number of square feet for each year by dividing the building's total construction cost by the average cost per square foot to construct a building ($144.8 / sq. ft.).
- To calculate building savings (e.g., energy, water, trash, O&M), we used data from a meta-analysis of 10 reports about 69 LEED-certified buildings. Because McGraw Hill's definition of the green construction market is similar to the design principles of LEED, we assumed that savings per square foot for LEED-certified buildings is a reasonable approximation of savings for non-LEED-certified green buildings.

Model

The annual green construction spending and savings estimates were grouped into nine economic sectors within the IMPLAN model. For each economic sector impacted, IMPLAN calculates the direct, indirect, and induced effects on GDP, jobs, and labor earnings (wages). Construction spending will generate positive economic impact, whereas savings will reduce economic activity within an industry sector.

Expenditures were assigned to five economic sectors based on an analysis of the types of buildings that are LEED certified. For several reasons, this study uses data for LEED-certified buildings, even though the green construction market includes non-LEED buildings. First, USGBC collects high-quality data on the types of buildings that are certified. Second, the types of buildings that obtain LEED certification are a reasonable approximation of the types of buildings that constitute the total green construction market. Finally, the type of building that is certified (e.g., commercial office building, healthcare building) corresponds well to the economic sectors within the modeling tool. According to this study, the five economic sectors that will be positively impacted are as follows:

- Construction of new nonresidential commercial and healthcare structures
- Construction of new nonresidential manufacturing structures
- Construction of other new nonresidential structures
- Construction of new residential permanent site single- and multi-family structures
- Maintenance and repair construction of nonresidential structures.

The five categories that will experience economic contraction as a result of the nonresidential and residential structure O&M savings are as follows:

- Maintenance and repair construction of nonresidential structures
- Maintenance and repair construction of residential structures
- Waste management and remediation services
- Water, sewage, and other water treatment systems
- Electric power generation, transmission, and distribution.

Appendix B describes in greater detail the approach used to determine these green construction expenditures and savings and offers additional methodology to determine the economic contribution from them.

Results

Once the absolute value of the expenditure impacts and the savings impacts were estimated in IMPLAN, the difference was calculated between the two to obtain the overall net economic impact of green construction. Over the nine-year time period from 2000 to 2008, green construction generated $173 billion dollars in GDP and supported over 2.4 million jobs that in turn provided $123 billion dollars in labor earnings. Over the five-year time period from 2009 to 2013, this study forecasts that green construction will generate an additional $554 billion dollars in GDP and will support over 7.9 million jobs that in turn will provide $396 billion in labor earnings. Exhibit 2-3 illustrates the total net economic impact effects of green construction in terms of GDP, jobs, and earnings. Exhibit 2-4, Exhibit 2-2, and Exhibit 2-6 illustrate the direct, indirect, and induced effects on GDP, jobs, and earnings.

Exhibit 2-3: Summary of Net Impact of Green Construction Expenditures

Type of Impact Supported by Green Construction Spending	Cumulative Net Impact	
	2000-2008	2009-2013
GDP (millions $2008)	$172,864	$554,057
Employment (jobs)	2,459,891	7,902,466
Labor Earnings (millions $2008)	$123,248	$395,662

Exhibit 2-4: Total Direct, Indirect, and Induced Impact of Green Construction on GDP

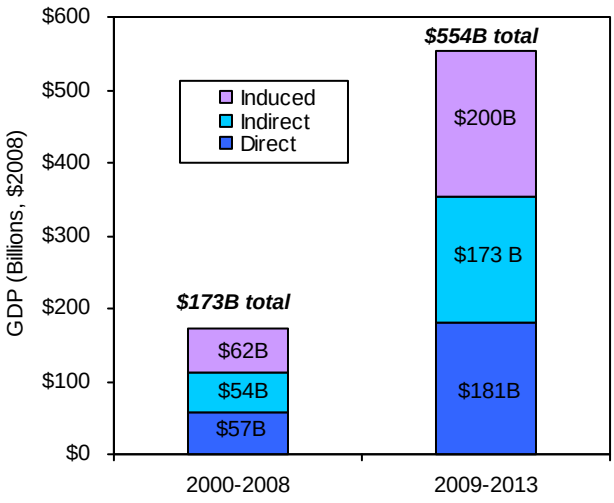


Exhibit 2-5: Total Direct, Indirect, and Induced Impact of Green Construction on Employment

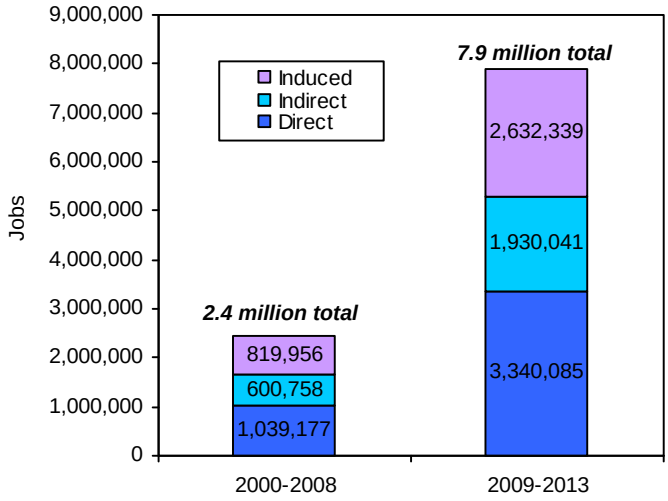
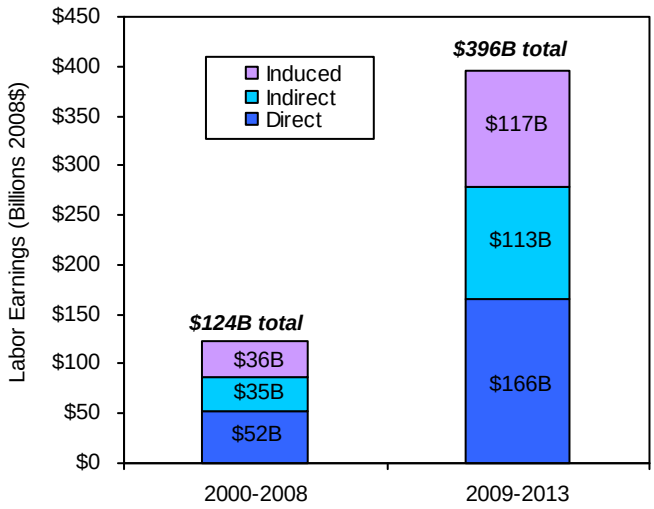


Exhibit 2-6: Total Direct, Indirect, and Induced Impact of Green Construction on Labor Earnings (in Billions 2008$)



3. USGBC Economic Impact

Booz Allen also estimated the economic impact directly attributable to USGBC. Because USGBC contributes to the economy in several ways—from developing the LEED green building rating system to selling reference guides and memberships—this study considered several approaches to estimating USGBC's economic impact. Of all the approaches considered, the development of the LEED rating system and the associated investments made by building owners to construct a LEED-certified building have the most significant economic impact.

To estimate USGBC's impact, Booz Allen conducted a meta-analysis of 10 reports and case studies about 69 LEED-certified buildings. We then created a database to catalog the LEED-related expenditures and savings associated with each building. To the fullest extent possible, all data were normalized to common metrics, such as the energy savings per square foot. The result of this meta-analysis was a set of data used to estimate the expenditures and savings associated with all of the buildings that have been certified from 2000–2008 and the expenditures and savings forecasted over the period 2009–2013. For both periods, the study estimates the impact in terms of direct, indirect, and induced effects on GDP, employment, and labor earnings.

Note: USGBC's direct economic impact cannot be compared to the overall green construction market for several reasons. First, the definition of the "green construction market" is broader and includes buildings that do not qualify for LEED certification. Second, the definition of the "green construction market" includes the total construction value of green buildings, not just the incremental costs associated with building a more environmentally friendly structure. By contrast, Section 3 only captures the costs directly attributable to meeting the requirements of the LEED rating system.

Approach

This study followed a three-step process to calculate the expenditures and savings resulting from LEED-certified buildings:

Step 1: Conduct a Meta-Analysis to Obtain Average Spending and Savings per Square Foot for LEED-Certified Buildings
Step 2: Collect and Forecast LEED-Certified Square Footage Data (2000–2008; 2009–2013)
Step 3: Multiply the Results of Step 1 and Step 2.

Step 1: Conduct a Meta-Analysis

We conducted a meta analysis of 10 reports covering 69 LEED-certified buildings. The data from each report was compiled into a database so that common attributes could be captured for each building, such as the following:

- Building location
- Square feet
- Year built
- LEED certification level

- LEED-related costs (absolute, or per sq. ft., including hard and soft costs)
- Energy savings (absolute, or per sq. ft.)
- Water savings (absolute, or per sq. ft.)
- Trash savings (absolute, or per sq. ft.)

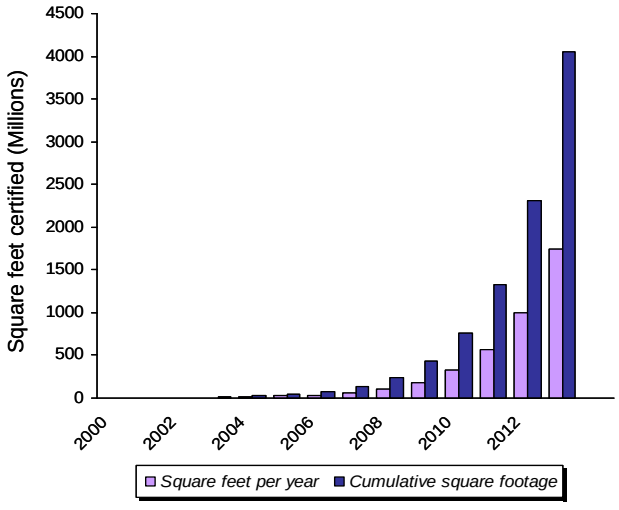
Using the values in the database, we normalized data—where possible—into a common denominator. Specifically, we translated as much data as possible into spending and savings per square foot. By doing this, we were able to calculate average spending and savings and extrapolate these data for the universe of LEED-certified buildings. Exhibit 3-1 displays the average spending and savings by category and the number of buildings that were used in each calculation.

Exhibit 3-1: LEED Spending and Savings Data per Square Foot

Category	Average Value per sqft.	Number of Buildings
LEED-related spending	$4.01	18
Energy savings	($0.51)	14
O&M savings	($0.32)	5
Water savings	($0.05)	7
Trash savings	($0.02)	5

Step 2: Collect/Forecast LEED-Certified Square Feet Data (2000–2008; 2009–2013)

For 2000-2008, the USGBC Project Database was used to calculate the total number of square feet certified to date. To forecast the number of square feet between 2009 and 2013, the study calculated the compounded annual growth rate (CAGR) between 2000 and 2008, which was approximately 75 percent. That growth rate was then applied to the forecast period. Finally, the study calculated the cumulative number of square feet certified, which generated a running total of how much space has been certified for each year. Exhibit 3-2 displays the annual and cumulative square feet for LEED-certified buildings to date and through the forecast period.



	Year	LEED Certified Square Feet per Year	Cumulative LEED Certified Square Feet
Actual	2000	677,600	677,600
	2001	974,165	1,651,765
	2002	2,205,696	3,857,461
	2003	7,298,301	11,155,762
	2004	12,320,035	23,475,797
	2005	22,571,885	46,047,682
	2006	34,190,106	80,237,788
	2007	58,218,726	138,456,514
	2008	105,805,992	244,262,506
Forecast	2009	185,160,487	429,422,993
	2010	324,030,852	753,453,845
	2011	567,053,991	1,320,507,836
	2012	992,344,484	2,312,852,320
	2013	1,736,602,847	4,049,455,167

Exhibit 3-2. Annual and Cumulative LEED-Certified Square Feet (2000-2013)

Step 3: Multiply the Results of Step 1 and Step 2
In this step, we calculated the annual LEED-related spending by multiplying the average LEED-related construction costs per square foot by the number of square feet certified each year. We then calculated the annual LEED-related savings per year by multiplying the saving per square foot per category (e.g., energy, O&M, trash, and water) by the cumulative number of LEED-certified square feet each year. Exhibit 3-3 displays the annual spending and savings attributable to the LEED rating system.

Exhibit 3-3: LEED Spending and Savings per Year (in Millions of 2003$)

			Spending (Millions$)	*Savings by Category (Millions$)*			
Year	LEED Certified Square Feet per Year	Cumulative LEED Certified Square Feet	$4.01/sqft	Energy ($0.52/sqft)	O&M *($0.32/sqft)*	Trash *($0.05/sqft)*	Water *($0.02/sqft)*
2000	677,600	677,600	$3	$(0)	$(0)	$(0)	$(0)
2001	974,165	1,651,765	$4	$(1)	$(1)	$(0)	$(0)
2002	2,205,696	3,857,461	$9	$(2)	$(1)	$(0)	$(0)
2003	7,298,301	11,155,762	$29	$(6)	$(4)	$(0)	$(1)
2004	12,320,035	23,475,797	$49	$(12)	$(8)	$(0)	$(1)
2005	22,571,885	46,047,682	$90	$(24)	$ (15)	$(1)	$(3)
2006	34,190,106	80,237,788	$137	$(41)	$ (26)	$(2)	$(4)
2007	58,218,726	138,456,514	$233	$(71)	$ (44)	$(3)	$(8)
2008	105,805,992	244,262,506	$424	$(125)	$ (78)	$(5)	$(13)
2009	185,160,487	429,422,993	$742	$(220)	$(138)	$(9)	$(23)
2010	324,030,852	753,453,845	$1,299	$(385)	$(242)	$(16)	$(41)
2011	567,053,991	1,320,507,836	$2,273	$(675)	$(424)	$(28)	$(72)
2012	992,344,484	2,312,852,320	$3,978	$(1,183)	$(742)	$(49)	$(126)
2013	1,736,602,847	4,049,455,167	$6,961	$(2,071)	$(1,299)	$(86)	$(221)

Assumptions

We made several assumptions given the available data:

- USGBC's direct economic impact is defined as the amount of spending by building owners that can be directly attributed to constructing a building to qualify for any LEED certification level (e.g., Certified, Silver, Gold, or Platinum).
- The amount building owners spent to achieve LEED certification includes hard costs, such as purchasing materials and systems, and soft costs, such as design and consulting fees.
- USGBC's impact was based on the number of square feet certified in the USGBC Project Database that the USGBC provided to Booz Allen. Buildings that were registered, but not certified, were not included. For the period 2009–2013, Booz Allen forecasted the number of square feet that will be certified based on the historical CAGR of certified square feet from 2000–2008. From 2000–2008, the CAGR of certified square feet is 75 percent. We believe that a 75 percent annual growth rate in the number of certified square feet over the next five years is reasonable because USGBC has increased its capacity to certify buildings and because of the backlog of buildings awaiting certification.
- USGBC's economic impact was calculated for the United States only. Therefore, the economic impact of certified buildings in other countries was excluded from this study.

Analysis

LEED-related construction spending and savings estimates were grouped into nine economic sectors within the IMPLAN model. For each economic sector impacted, IMPLAN calculated the direct, indirect, and induced effects on GDP, jobs, and labor earnings (wages). Construction spending will generate positive economic impact, whereas savings will reduce economic activity within an industry sector.

We then assigned LEED-related spending to five economic sectors. These five sectors were selected based on the type of buildings that have been LEED certified because spending on a new high-rise office building will have a different economic impact than retrofitting an existing high-rise office building. Similarly, construction spending on a hospital will have a different economic impact than construction spending on single family homes. The five economic sectors that LEED-related spending will positively impact are as follows:

- Construction of new nonresidential commercial and healthcare structures
- Construction of new nonresidential manufacturing structures
- Construction of other new nonresidential structures
- Construction of new residential permanent site single- and multi-family structures
- Maintenance and repair construction of nonresidential structures.

The industry sectors that experience economic contraction due to LEED-related savings are as follows:

- Maintenance and repair construction of nonresidential structures
- Maintenance and repair construction of residential structures
- Waste management and remediation services
- Water, sewage, and other water treatment systems
- Electric power generation, transmission, and distribution.

Appendix C provides the detailed methodology used to determine how expenditures and savings were allocated to each industry sector. Appendix C summarizes the data collected from the meta-analysis.

Results

Once the absolute value of the expenditure and savings impacts were estimated in IMPLAN, the difference was calculated between the two to obtain the total net economic impact in terms of GDP, employment, and labor earnings. Over the nine-year time period from 2000 to 2008, LEED-related construction spending generated $830 million in GDP and supported 15,000 jobs that in turn provided $703 million in labor earnings. Over the five-year time period from 2009 to 2013, the study forecasted that LEED-related spending will generate an additional $12.5 billion dollars in GDP and will support 230,000 jobs that will in turn provide $10.7 billion in labor earnings. Exhibit 3-4 illustrates the total net economic effects of LEED expenditures in terms of GDP, jobs, and earnings. Exhibit 3-5, Exhibit 3-6, and Exhibit 3-7 illustrate the direct, indirect, and induced effects on GDP, jobs, and earnings.

Exhibit 3-4: Net Impact of USGBC LEED Certification

Type of Impact Supported by USGBC LEED Certification	Cumulative Net Impact	
	2000-2008	2009-2013
GDP (millions $2008)	$830	$12,530
Employment (jobs)	14,998	229,850
Labor Earnings (millions $2008)	$703	$10,729

Exhibit 3-5: Total Direct, Indirect, and Induced Economic Impact of USGBC LEED Certification on GDP (in 2008$)

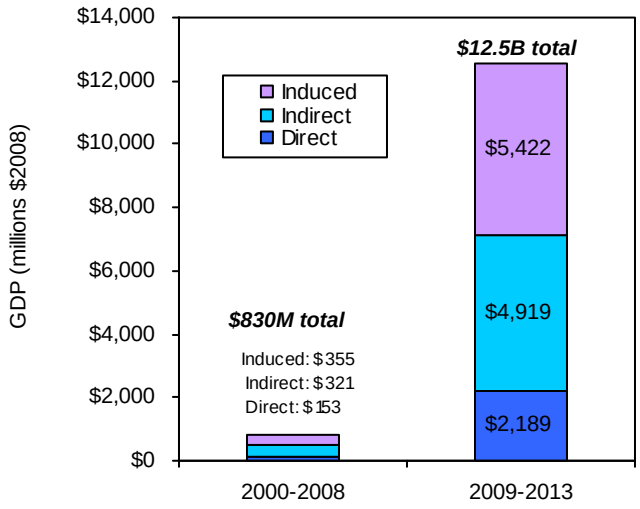


Exhibit 3-6: Total Direct, Indirect, and Induced Economic Impact of USGBC LEED Certification on Employment

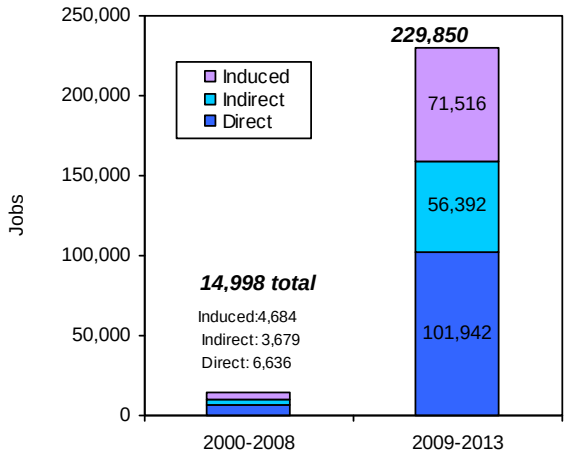
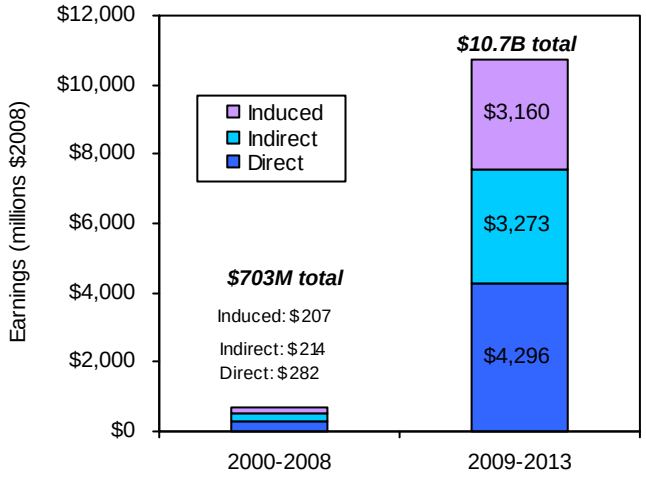


Exhibit 3-7: Total Direct, Indirect, and Induced Economic Impact of USGBC LEED Certification on Earnings (in 2008$)



4. Types of Jobs Created

In Sections 2 and 3, Booz Allen estimated the total economic impact of the green construction market and LEED certification over nine industry sectors. Although we were able to estimate the number of jobs created in each sector, the modeling tool does not report which specific occupations will be impacted. Therefore, we conducted a high-level analysis to show a sample of the jobs affected in each industry.

For this analysis, we followed a three-step process to identify the types of jobs created in the green construction industry. First, we compared IMPLAN industry sectors to the North American Industry Classification System (NAICS) because the U.S. federal government categorizes occupations according to NAICS codes rather than IMPLAN industry codes. Second, we reviewed data from the Bureau of Labor Statistics (BLS) to identify the most prevalent occupations for each NAICS code. Finally, we selected a sample of the occupations in each industry and estimated the formal schooling required for each occupation by reviewing the BLS's *Occupational Outlook Handbook* (OOH), a document produced annually that describes each occupation.

Based on this comparison of IMPLAN codes and NAICS sectors, we selected the following NAICS industry sectors from which to draw occupation data:

- Nonresidential construction (NAICS code: 236200)
- Residential construction (NAICS code: 236100)
- Electric power generation, transmission, and distribution (NAICS code: 221100)
- Water, sewage, and other water treatment systems (NAICS code: 221300)
- Waste management and remediation services (NAICS code: 56200).

Exhibit 4-1 through Exhibit 4-5 provide a sample of the individual occupations affected by either green or LEED certification construction expenditures and savings. The required education numbers in these charts reflect only formal schooling required for each job, but the OOH details further education that may be required in the form of on-the-job training, apprenticeships, or state certification. This sampling of the types of jobs supported by each industry shows a large range of skills, education levels, and salaries for all five industries.

Exhibit 4-1: Job Statistics by NAICS Industry: Nonresidential Construction

Non-Residential Construction	Average Annual Salary	% of Sector	Required Education Attainment (years)
Construction Managers	$88,550	6.36%	16
Civil Engineers	$78,630	2.33%	16
Secretaries (not Executive, Legal, or Medical)	$30,680	1.76%	12
Carpenters	$47,730	19.36%	12
Construction Laborers	$35,710	15.61%	12
Truck Drivers, Heavy or Tractor-Trailer	$38,740	0.74%	12
Cost Estimators	$68,900	2.61%	16
Industry-Wide	$52,200		

Exhibit 4-2: Job Statistics by NAICS Industry: Residential Construction

Residential Construction	Average Annual Salary	% of Sector	Required Education Attainment (years)
Construction Managers	$84,130	4.74%	16
Real Estate Sales Agents	$63,520	3.27%	14
Secretaries (not Executive, Legal, or Medical)	$27,580	1.69%	12
Carpenters	$41,010	30.47%	12
Construction Laborers	$31,150	13.30%	12
Janitors and Cleaners (not Maids or Housekeeping)	$23,850	0.57%	none
Cost Estimators	$59,110	1.93%	16
Industry-Wide	$45,110		

Exhibit 4-3: Job Statistics by NAICS Industry: Electric Power Generation, Transmission, and Distribution

Electric Power Generation, Transmission, and Distribution	Average Annual Salary	% of Sector	Required Education Attainment (years)
Engineering Managers	$115,700	1.08%	18
Accountants and Auditors	$66,270	1.41%	16
Electrical Engineers	$84,450	3.04%	16
Customer Service Representatives	$32,810	4.76%	12
Electric Power Line Installers and Repairers	$57,560	12.87%	12
Power Plant Operators	$59,550	6.04%	12
Electrical Repairers, Powerhouse, Substation, and Relay	$61,330	4.36%	14
Industry-Wide	$62,480		

Exhibit 4-4: Job Statistics by NAICS Industry: Water, Sewage, and Other Water Treatment Systems

Water, Sewage, and Other Systems	Average Annual Salary	% of Sector	Required Education Attainment (years)
Plumbers, Pipefitters, and Steamfitters	$39,520	2.90%	14
Maintenance and Repair Workers, General	$35,420	3.22%	12
Secretaries (not Executive, Legal, or Medical)	$24,470	4.44%	12
General and Operations Managers	$98,140	2.57%	16
Water and Liquid Waste Treatment System Operators	$39,410	24.41%	12
Meter Readers, Utilities	$31,130	6.06%	12
Laborers and Freight, Stock, and Material Hand Movers	$27,260	1.66%	none
Industry-Wide	$42,940		

Exhibit 4-5: Job Statistics by NAICS Industry: Waste Management and Remediation Services

Waste Management and Remediation Services	Average Yearly Salary	% of Sector	Required Education Attainment (years)
Truck Drivers, Heavy and Tractor Trailer	$36,630	12.65%	12
Refuse and Recyclable Material Collectors	$33,190	20.22%	12
Laborers and Freight, Stock, and Material Movers, Hand	$23,980	4.90%	none
General and Operations Managers	$98,980	2.33%	16
Bus and Truck Mechanics and Diesel Engine Specialists	$40,370	2.56%	12
Sales Representatives, Services, Other	$58,050	1.31%	12
Hazardous Materials Removal Workers	$40,800	9.38%	12
Total	$41,290		

Our analysis revealed that there are many jobs across all sectors that require only 12 years of formal schooling, as well as some that may require 16 years of education (a college degree) or more. There are also many more jobs being created than being eliminated. Additionally, the jobs being created span the same wide range of skills, educational levels, and salaries as the jobs being eliminated. People whose jobs are being eliminated as a result of reduced operational building expenditures may be able to find alternative employment opportunities in the construction industry with the same formal schooling requirements. Moreover, the industries in which jobs are being eliminated have lower industry-wide average salaries than the industries in which jobs are being created (except for the electricity industry), suggesting that if displaced workers are able to transition to a similar created green job, they are likely to experience an increase in income. Exhibit 4-6 through Exhibit 4-9 display the actual and estimated job gains and losses for each NAICS industry sector for 2000–2008 and 2009–2013.

Exhibit 4-6: Green Construction Impacts by NAICS Industry Sector for 2000–2008 and 2009–2013

Impact of Green Construction Spending by NAICS Industries	2000-2008			2009-2013		
	GDP (Millions of 2008$)	Employment	Earnings (Millions of 2008$)	GDP (Millions of 2008$)	Employment	Earnings (Millions of 2008$)
Nonresidential Construction	$164,104	2,329,999	$117,163	$528,145	7,497,566	$377,046
Residential Construction	$10,917	142,988	$7,023	$35,228	461,443	$22,663
Electric Power Generation, Transmission, and Distribution	$(1,827)	(9,668)	$(733)	$(7,890)	(41,745)	$(3,163)
Water, Sewage, and Other Systems	$(244)	(2,409)	$(151)	$(1,053)	(10,401)	$(654)
Waste Management Remediation Services	$(86)	(1,019)	$(54)	$(372)	(4,398)	$(231)
Total	**$172,864**	**2,459,891**	**$123,248**	**$554,057**	**7,902,466**	**$395,662**

Exhibit 4-7: Green Construction Market Job Creation by Industry Sector (2000–2008, 2009–2013)

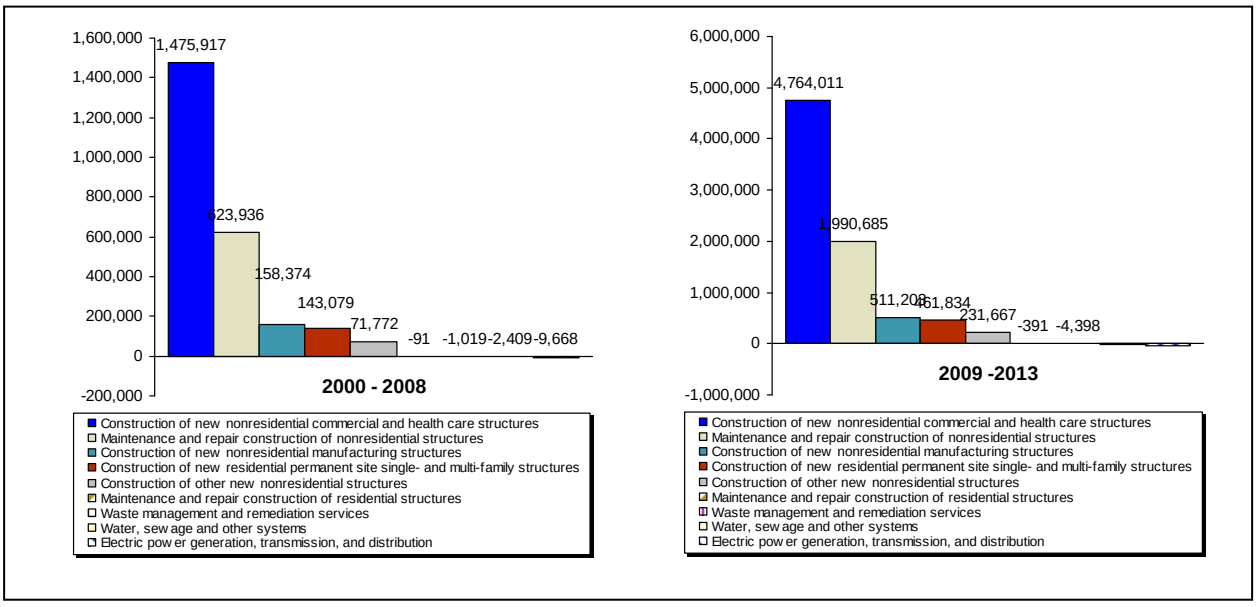


Exhibit 4-8: USGBC Impacts by NAICS Industry Sector

Impact of USGBC LEED Certification Spending by NAICS Industries	2000-2008			2009-2013		
	GDP (Millions of 2008$)	Employment	Earnings (Millions of 2008$)	GDP (Millions of 2008$)	Employment	Earnings (Millions of 2008$)
Nonresidential Construction	$1,169	16,390	$830	$18,057	252,981	$12,822
Residential Construction	$94	1,240	$61	$1,465	19,312	$945
Electric Power Generation, Transmission, and Distribution	$(367)	(1,943)	$(147)	$(5,923)	(31,334)	$(2,374)
Water, Sewage, and Other Systems	$(49)	(484)	$(30)	$(791)	(7,807)	$(491)
Waste Management Remediation Services	$(17)	(205)	$(11)	$(279)	(3,301)	$(174)
Totals	**$830**	**14,998**	**$703**	**$12,530**	**229,850**	**$10,729**

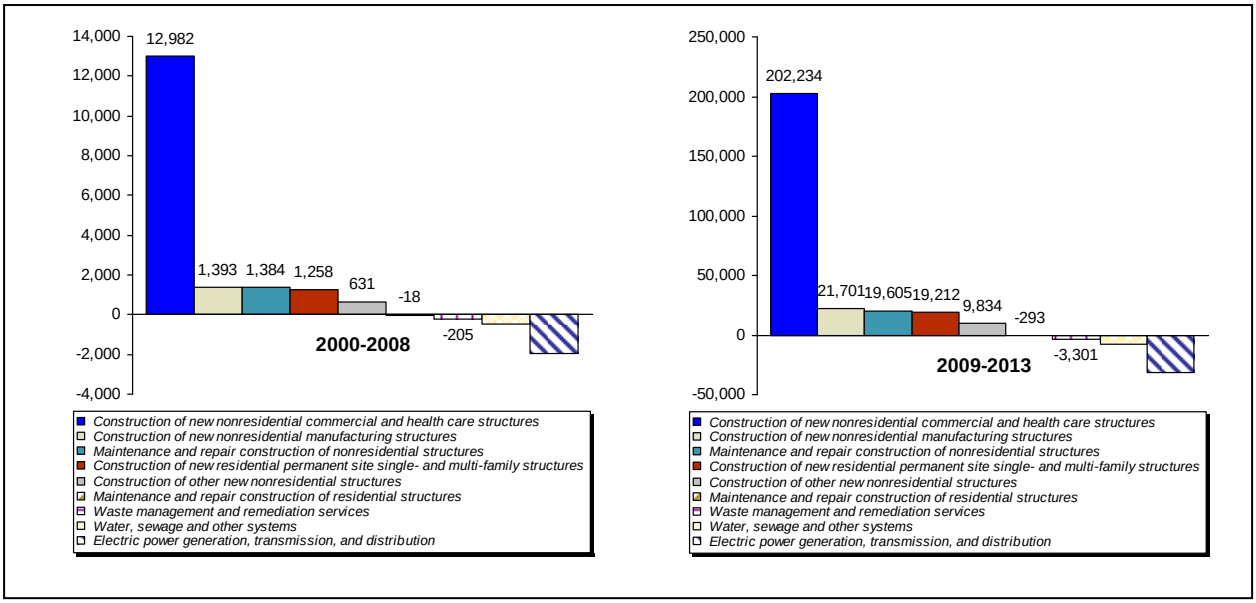


Exhibit 4-9: USGBC Job Creation by Industry Sector (2000–2008, 2009–2013)

5. Energy Savings

Booz Allen also calculated a high-level estimate of the energy and environmental benefits resulting from green building construction. Because we did not have data in terms of kilowatt hours saved, we derived kilowatt hours saved from the total dollar value of energy savings using the 2008 national electricity price average published by the Energy Information Agency. This study's analysis assumes that 2008 national average energy price is a reasonable approximation of the average energy price over the 2000–2013 time period.

Energy Savings (Dollars)
This study confirmed that green buildings generate substantial energy savings. From 2000–2008, green construction and renovation generated $1.3 billion in energy savings. Of that $1.3 billion, LEED-certified buildings accounted for $281 million. Forecasted energy savings are even more dramatic. From 2009–2013, the overall green construction market is expected to generate $6 billion in energy savings. Of that $6 billion, LEED-certified buildings may account for as much as $4.8 billion of the total.

Energy Savings (Kilowatt Hours)
To calculate energy savings, we converted energy savings (in terms of dollars) into the equivalent energy savings in kilowatt hours (kWh). To do this conversion, we used the Energy Information Agency's average cost of electricity in the United States for 2008, which was 9.95 cents per kWh. Exhibit 5-1 displays the kilowatt hours saved (billions of kWh) for the total green construction market and for LEED-certified buildings.

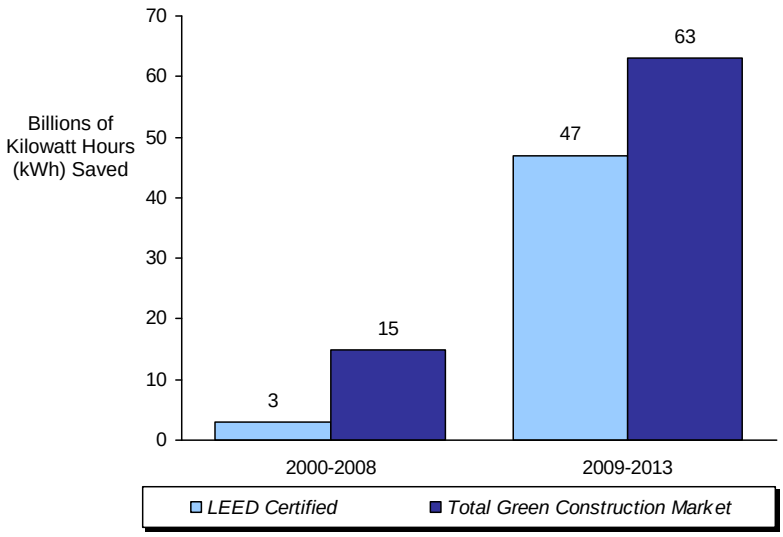


Exhibit 5-1: Billions of Kilowatt (kWh) Hours Saved from the Total Green Construction Market and LEED-Certified Buildings

Environmental Benefits (CO2 Saved)

Reduced energy consumption results in environmental benefits, such as reduced CO2 emissions. To calculate the CO2 saved from reduced energy savings, we converted kilowatt hour savings into millions of metric tons of carbon saved using the Environmental Protection Agency's Greenhouse Gas Equivalencies calculator[1]. Exhibit 5-2 displays carbon savings (million metrics tons) for the total green construction market and for LEED-certified buildings.

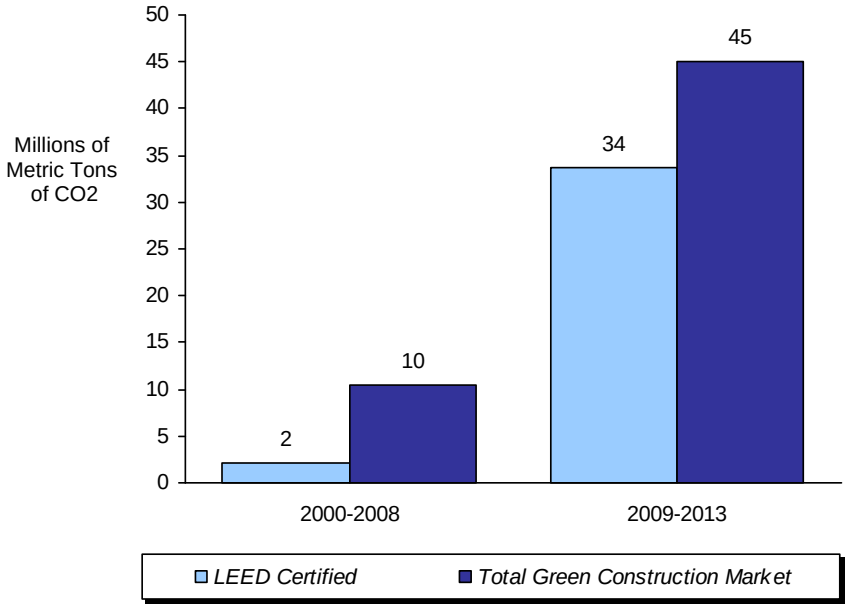


Exhibit 5-2: Carbon Saved (millions of metric tons) from the Total Green Construction Market and LEED-Certified Buildings

[1] Greenhouse Gas Equivalencies Calculator, available at http://www.epa.gov/cleanrgy/energy-resources/calculator.html

Environmental Benefits (CO2 Equivalency)
We used EPA's Greenhouse Gas Equivalencies calculator to convert CO2 savings (in terms of metric tons) into other common environmental metrics. Exhibit 5-3 displays the carbon equivalencies for five metric categories: cars, single-family homes, barrels of oil, acres of forest, and coal power plants.

Exhibit 5-3. Carbon Equivalencies for Five Metric Categories, 2000–2008 and 2009–2013

		2000–2008	2009–2013
LEED-Certified Buildings	Passenger cars removed from the road	377,000	6,100,000
	Emissions from single family homes	293,000	4,700,000
	Barrels of oil	4,800,000	77,600,000
	Acres of forest preserved	21,000	337,000
	Coal power plants	0.5	7
Total Green Construction Market	Passenger cars removed from the road	1,900,000	8,100,000
	Emissions from single family homes	1,500,000	6,300,00
	Barrels of oil	23,900,000	103,000,000
	Acres of forest preserved	104,000	450,000
	Coal power plants	2	10

6. Conclusions

The economic impact from green building construction is significant and will continue to grow as the demand for green buildings rises. Green construction spending currently supports over 2 million jobs and generates over 100 billion dollars in GDP and wages. By the year 2013, this study estimates that green buildings will support nearly 8 million jobs across occupations ranging from construction managers and carpenters to truck drivers and cost estimators. USGBC can also lay claim to supporting job creation. LEED-related spending has already generated 15,000 jobs since 2000, and by 2013, an additional 230,000 jobs will be created.

Green Construction Economic Impact

From 2000–2008, the green construction market has:

- Generated $173 billion dollars in GDP
- Supported over 2.4 million jobs
- Provided $123 billion dollars in labor earnings

From 2009–2013, this study forecasts that green construction will:

- Generate an additional $554 billion dollars in GDP
- Support over 7.9 million jobs
- Provide $396 billion in labor earnings

USGBC Economic Impact

From 2000–2008, LEED-related construction spending has:

- Generated $830 million in GDP
- Supported 15,000 jobs
- Provided $703 million in labor earnings

From 2009–2013, this study forecasts that LEED-related spending will:

- Generate an additional $12.5 billion dollars in GDP
- Support 230,000 jobs

Appendix A: IMPLAN Background and General Methods

The IMPLAN modeling system combines the U.S. Bureau of Economic Analysis Input-Output (IO) Benchmarks with other data to construct quantitative models of trade flow relationships between businesses and between businesses and final consumers. The IMPLAN input-output accounts are based on industry survey data collected periodically by the U.S. Bureau of Economic Analysis and follow a balanced account format recommended by the United Nations. The IMPLAN modeling system has been in use since 1979 and is currently used by over 500 private consulting firms, university research centers, and government agencies.

Each industry that produces goods and services generates demands for other goods and services. Multipliers describe these iterations (IMPLAN Manual, 2003). Multipliers can be described through the following definitions.

- **Direct effects** are the initial change to the industry or institution in question.
- **Indirect effects** are the changes in inter-industry purchases as they respond to the new demands of the directly affected industries. The direct change creates increases in economic activity for downstream businesses that support these direct industries.
- **Induced effects** are the increases in household income expenditures generated by the direct and indirect effects.

A Social Accounting Matrix (SAM) multiplier, as modeled by IMPLAN, is defined as the sum of the direct, indirect and induced effects, divided by the direct effect. It shows the amount of additional economic activity generated by the direct economic stimulus. Therefore, multipliers closer to one indicate very little additional activity generated, and larger multipliers indicate more downstream or rollover (i.e., indirect and induced) economic activity.

The United States data file was obtained from the Minnesota IMPLAN Group (MIG). The model was then constructed and the multipliers created for the national area data. The IMPLAN methodology is explained for each of the categories of economic contribution. Green construction economic contribution methodology is described in Appendix B, LEED certified construction economic contribution methods are described in Appendix C, and IMPLAN results for both green and LEED certified construction are described in Appendix D and E respectively.

Appendix B: Green Construction Impact Methodology and Data

This appendix is organized into four parts. Part 1 explains the method used to estimate spending data for the green construction market. Part 2 explains the method used to estimate savings data. Part 3 explains how the spending and savings data were assigned to the IMPLAN economic sectors, and Part 4 contains all data tables and figures.

Spending Data & Calculations

This study collected data on the value of the green construction market from construction outlook reports published by McGraw Hill. McGraw Hill periodically forecasts the value of the green construction market based on its proprietary database that tracks over 300,000 projects annually. Information from this database is widely cited in the construction industry and is used by the U.S. Census Bureau to calculate the construction sector's share of gross domestic product.

The green construction market is defined by McGraw Hill as follows:

> "We define green building as one built to LEED standards, an equivalent green building certification program, or one that incorporates numerous green building elements across five category areas: energy efficiency, water efficiency, resource efficiency, responsible site management and improved indoor air quality. Projects that only feature a few green building products (e.g., HVAC systems, waterless urinals) or that only address one aspect of a green building, such as energy efficiency, are not included in this calculation."

Based on this definition, McGraw Hill will evaluate a project to determine whether it should be categorized as part of the green construction market. If a project is determined to meet the criteria above, the entire project value is deemed to be part of the green construction market, not just the share of the project that can be traced to green building elements. The value of each project is logged in the database according to the construction start date. Therefore, if a $100 million building is scheduled to break ground in 2010, the entire $100 million project value will be assigned to 2010, regardless of the planned construction schedule or how long the project actually takes to complete. The database primarily captures new construction data; however, major renovations are also included.

McGraw Hill provides estimates for three years: 2005, 2008, and 2013. Where a range of values was provided, this study used the midpoint of the values. It then used these numbers to generate an estimate of the green construction market for all other years between 2000 and 2013. The result of these estimates can be seen in Exhibit B-1.

McGraw Hill does not report the number of square feet associated with the green construction market. This information is necessary to calculate the green construction market savings. To do this, we obtained data on the average construction cost per square foot for a new building. The average cost to build a new office building is approximately $144.80 per square foot. The data is displayed in Exhibit B-2.

Assuming an average construction cost of $144.80, we divided the value of overall green construction market by $144.80. The result of this calculation is the number of square feet added to the green construction market each year.

Savings Data and Calculations

Green buildings generate savings for building owners by reducing demand for energy, water, trash removal, and O&M labor. For the purposes of calculating the number of net jobs created or retained, the value of savings reduces income for those impacted economic sectors. We conducted an analysis of several reports on the savings associated with green buildings. Based on our review of these studies, we calculated the average savings per square foot by savings category. The data is displayed in Exhibit B-3. We then multiplied the average savings per square foot by the cumulative number of square feet in the total green construction market. By using the cumulative number of square feet of green construction, we are able to calculate the annual savings for all green buildings that have been constructed. Exhibit B-4 displays savings by category.

Allocate Spending and Savings Data to IMPLAN Sectors

Spending

Construction spending was assigned to 5 of the 440 economic sectors contained in the economic modeling tool. Four of the economic sectors identified pertain to construction of various new building types, including commercial buildings, healthcare structures, manufacturing structures, nonresidential structures, and residential single and multi-family housing units. One economic sector captures renovations and improvements to nonresidential structures. The IMPLAN sectors identified are listed in Exhibit B-5.

Savings

Data on green construction savings was assigned to five economic sectors. We selected the appropriate economic sectors based on the type of savings generated. For example, energy savings were assigned to IMPLAN sector 31, which consists of companies in the electric power generation, transmission, and distribution sector. Water savings were assigned to IMPLAN sector 33, which covers companies in the water and sewage treatment sector. Each category of savings clearly pertained to an industry code within IMPLAN. Exhibit B-6 displays the IMPLAN sectors that were assigned for each savings category and shows how the value of savings were allocated.

Net Impact by Economic Sector

The net impact by economic sector was calculated by subtracting the savings by economic sector from the spending by economic sector. Spending was assigned to five economic sectors (34, 35, 36, 37, and 39). Savings data were also assigned to five economic sectors (31, 33, 39, 390, 40). The net impact by IMPLAN sector is displayed in Exhibit B-8.

Data Tables and Figures

Exhibit B-1: Estimated Value of the Green Construction Market by Square Footage (in billions of $2008)

	Green Construction Market Total	Square feet per year	Cumulative square footage
2000	$4,571	31,567,620	31,567,620
2001	$5,228	36,106,714	67,674,335
2002	$5,810	40,127,861	107,802,195
2003	$6,745	46,583,198	154,385,394

	Green Construction Market Total	Square feet per year	Cumulative square footage
2004	$8,242	56,918,664	211,304,058
2005*	$10,028	69,257,792	280,561,849
2006	$17,464	120,613,170	401,175,019
2007	$28,180	194,616,261	595,791,280
2008*	$41,921	289,512,209	885,303,489
2009	$51,814	357,837,090	1,243,140,580
2010	$64,042	442,286,644	1,685,427,223
2011	$79,156	546,666,291	2,232,093,515
2012	$97,837	675,679,536	2,907,773,051
2013*	$120,926	835,139,907	3,742,912,958

** Green construction market estimate provide by McGraw Hill*

Exhibit B-2: Average Construction Cost per Square Foot

Building Type	Average construction cost (per square foot)
Office (1 Story)	$154.86
Office (11-20 Story)	$132.47
Office (2-4 Story)	$149.05
Office (5-10 Story)	$142.81
Average	**$144.80**

Source: RS Means

Exhibit B-3: Savings per Square Foot by Category

Savings Category	Savings (square foot)	% of Total Savings
Energy	$0.51	56%
O&M	$0.32	36%
Water	$0.05	6%
Trash	$0.02	2%
Total	**$0.91**	**100%**

Source: Booz Allen analysis of 10 reports comprising 69 LEED certified buildings

Exhibit B-4: Saving by Category

		Savings by category (Millions$)			
Year	Cumulative Square Feet	Energy ($0.51/sqft)	O&M ($0.32/sqft)	Trash ($0.05/sqft)	Water ($0.02/sqft)
2000	31,567,620	$ (16)	(10)	$ (1)	$ (2)
2001	67,674,335	$ (35)	(22)	$ (1)	$ (4)
2002	107,802,195	$ (55)	(35)	$ (2)	$ (6)
2003	154,385,394	$ (79)	(50)	$ (3)	$ (8)
2004	211,304,058	$ (108)	(68)	$ (4)	$ (12)
2005	280,561,849	$ (144)	(90)	$ (6)	$ (15)
2006	401,175,019	$ (205)	(129)	$ (8)	$ (22)
2007	595,791,280	$ (305)	(191)	$ (13)	$ (33)
2008	885,303,489	$ (453)	(284)	$ (19)	$ (48)
2009	1,243,140,580	$ (636)	(399)	$ (26)	$ (68)
2010	1,685,427,223	$ (862)	(541)	$ (36)	$ (92)
2011	2,232,093,515	$ (1,142)	(716)	$ (47)	$ (122)
2012	2,907,773,051	$ (1,487)	(933)	$ (61)	$ (159)
2013	3,742,912,958	$ (1,915)	(1,200)	$ (79)	$ (204)

Exhibit B-5: LEED Certified Buildings (by Square Feet), 2000–2008

LEED Certified Categories	LEED Certified Square feet	% of total	Equivalent IMPLAN Code
Nonresidential (commercial)	168,169,140	60%	34
Nonresidential (manufacturing)	19,798,410	7%	35
Non-esidential (other)	7,890,170	3%	36
New residential	22,213,072	8%	37
Maintenance and Repair (existing building)	66,276,714	24%	39
Total LEED certified square footage	***280,439,221***		

Exhibit B-6: Green Construction Spending by Economic Sector (in Millions of Dollars)

	Construction of new nonresidential commercial and health care structures	Construction of new nonresidential manufacturing structures	Construction of other new nonresidential structures	Construction of new residential permanent site single- and multi-family structures	Maintenance and repair construction of nonresidential maintenance and repair
IMPLAN Sector	*34*	*35*	*36*	*37*	*39*
Allocation by Sector	*60%*	*7%*	*3%*	*7%*	*24%*
2000	$2,741	$323	$129	$298	$1,080
2001	$3,135	$369	$147	$341	$1,236
2002	$3,484	$410	$163	$379	$1,373
2003	$4,045	$476	$190	$440	$1,594
2004	$4,942	$582	$232	$538	$1,948
2005	$6,014	$708	$282	$655	$2,370
2006	$10,473	$1,233	$491	$1,140	$4,127
2007	$16,898	$1,989	$793	$1,839	$6,660
2008	$25,138	$2,960	$1,179	$2,736	$9,907
2009	$31,071	$3,658	$1,458	$3,382	$12,245

	Construction of new nonresidential commercial and health care structures	Construction of new nonresidential manufacturing structures	Construction of other new nonresidential structures	Construction of new residential permanent site single- and multi-family structures	Maintenance and repair construction of nonresidential maintenance and repair
2010	$38,404	$4,521	$1,802	$4,180	$15,135
2011	$47,467	$5,588	$2,227	$5,167	$18,707
2012	$58,669	$6,907	$2,753	$6,386	$23,122
2013	$72,515	$8,537	$3,402	$7,893	$28,579

Exhibit B-7: Green Construction Savings by Economic Sector (in Millions of Dollars)

	Total Green Savings	Maintenance and repair construction of nonresidential structures	Maintenance and repair construction of residential structures	Waste management and remediation services	Water, sewage and other systems	Electric power generation, transmission, and distribution
IMPLAN Sector		39	40	390	33	31
Allocation by Sector		35%	0.3%	2%	6%	56%
2000	($29)	($10)	($0)	($1)	($2)	($16)
2001	($61)	($22)	($0)	($1)	($4)	($35)
2002	($98)	($34)	($0)	($2)	($6)	($55)
2003	($140)	($49)	($0)	($3)	($8)	($79)
2004	($192)	($67)	($1)	($4)	($12)	($108)
2005	($255)	($89)	($1)	($6)	($15)	($144)
2006	($364)	($128)	($1)	($8)	($22)	($205)
2007	($541)	($190)	($1)	($13)	($33)	($305)
2008	($804)	($282)	($2)	($19)	($48)	($453)
2009	($1,129)	($396)	($3)	($26)	($68)	($636)
2010	($1,530)	($536)	($4)	($36)	($92)	($862)
2011	($2,027)	($710)	($6)	($47)	($122)	($1,142)
2012	($2,640)	($925)	($7)	($61)	($159)	($1,487)
2013	($3,399)	($1,191)	($9)	($79)	($204)	($1,915)

Exhibit B-8: Green Construction Net Impact by Economic Sector

NET IMPACT BY ECONOMIC SECTOR	Construction of new nonresidential commercial and health care structures	Construction of new nonresidential manufacturing structures	Construction of other new nonresidential structures	Construction of new residential permanent site single- and multi-family structures	Maintenance and repair construction of nonresidential structures	Maintenance and repair construction of residential structures	Waste management and remediation services	Water, sewage and other systems	Electric power generation, transmission, and distribution	NET ECONOMIC IMPACT BY YEAR
IMPLAN Sector	34	35	36	37	39	40	390	33	31	
2000	$2,741	$323	$129	$298	$1,070	$0	-$1	-$2	-$16	$4,542
2001	$3,135	$369	$147	$341	$1,214	$0	-$1	-$4	-$35	$5,167
2002	$3,484	$410	$163	$379	$1,339	$0	-$2	-$6	-$55	$5,713
2003	$4,045	$476	$190	$440	$1,545	$0	-$3	-$8	-$79	$6,605
2004	$4,942	$582	$232	$538	$1,881	-$1	-$4	-$12	-$108	$8,050
2005	$6,014	$708	$282	$655	$2,281	-$1	-$6	-$15	-$144	$9,774
2006	$10,473	$1,233	$491	$1,140	$4,000	-$1	-$8	-$22	-$205	$17,100
2007	$16,898	$1,989	$793	$1,839	$6,470	-$1	-$13	-$33	-$305	$27,639
2008	$25,138	$2,960	$1,179	$2,736	$9,625	-$2	-$19	-$48	-$453	$41,117
2009	$31,071	$3,658	$1,458	$3,382	$11,850	-$3	-$26	-$68	-$636	$50,685
2010	$38,404	$4,521	$1,802	$4,180	$14,599	-$4	-$36	-$92	-$862	$62,512
2011	$47,467	$5,588	$2,227	$5,167	$17,997	-$6	-$47	-$122	-$1,142	$77,129
2012	$58,669	$6,907	$2,753	$6,386	$22,197	-$7	-$61	-$159	-$1,487	$95,196
2013	$72,515	$8,537	$3,402	$7,893	$27,388	-$9	-$79	-$204	-$1,915	$117,528

Appendix C: USGBC Impact Methodology and Data

This appendix is organized into four parts. Part 1 describes this study's meta-analysis of several reports on LEED-certified buildings. Part 2 explains the method this study used for calculating the amount of money spent to build a LEED-certified building. Part 3 explains the method used for calculating the savings that result from LEED-certified buildings, and Part 4 explains how the spending and savings data were assigned to the IMPLAN economic sectors. Part 5 contains all of the data tables and figures.

Meta-Analysis

We began our research for this study by gathering data on the cost and savings associated with construction a LEED-certified building. We quickly discovered a shortage of rigorous reports and studies on this topic. Instead, most data available is from case studies on single buildings. However, we identified 10 reports that analyzed multiple buildings. These ten reports included data for 69 LEED-certified buildings. Rather than using a single study as the basis for our analysis, we decided to aggregate data from all buildings into a single database. By aggregating data from multiple reports, we were able to increase the number of buildings from which this study bases its findings.

Each study has its own methodology and reporting framework. We systematically reviewed each study, taking into account the different approaches used. We then populated a database by entering each building as an individual record. To the fullest extent possible, we captured the same information for each building, including the following:

- Location
- Building type
- Square feet
- Year built
- LEED award level attained
- LEED-related expenses
- Energy savings
- Water savings
- Trash savings
- O&M savings.

Because each study reported data differently, we normalized all data in terms of a common denominator. We selected *per square foot* as the denominator because this is the standard unit of measurement in the building industry. As a result of this process, we calculated the LEED-related expenditures and savings per square foot for as many buildings as possible. Of the 69 buildings in our database, we were able to calculate LEED expenditures per square foot for 18 buildings. There was less data available on savings per square foot for the following sectors: Energy (14), O&M (5), Trash (5), and Water (7).

Meta-Analysis: Summary Statistics

- The database contains 69 buildings, 30 government buildings, and 39 private buildings
- Of the 69 buildings, 60 are new construction and 9 are renovations
- Of the 69 buildings, LEED award level ranged from Certified (22) and Silver (27) to Gold (17) and Platinum (3)
- The number of buildings reporting LEED expenditures per square foot is 18
- The number of buildings reporting energy savings per square foot is 14
- The number of buildings reporting O&M savings per square foot is 5
- The number of buildings reporting trash savings per square foot is 5
- The number of buildings reporting water savings per square foot is 7

Spending Data and Calculations

Using data from the meta-analysis, we calculated that the average cost for LEED-related expenditures to be $4.01/square foot (see Exhibit C-1). This calculation includes both hard and soft costs. Hard costs include equipment purchases such as waterless urinals; soft costs include design and consulting fees.

We then gathered data on the number of LEED-certified square feet from 2000–2008. This data was provided to Booz Allen by USGBC. We then forecasted the number of square feet that will be certified from 2009–2013. We conducted the forecast by calculating the historic growth rate in the number of square feet certified from 2000–2008. Over this period, the compounded annual growth rate (CAGR) for the number of square feet that have been certified is 75 percent. That is, the annual average growth rate over this period is 75 percent. This is a reasonable growth rate over the next five years because USGBC has increased its capacity to certify buildings, and there is a backlog of buildings seeking certification. Exhibit C-2 displays the number of certified square feet to date, plus the forecasted square feet through the year 2013. For each year, we multiplied the certified square feet by the amount of spending directly attributable to meeting the requirement of the LEED rating system ($4.01 / sq. ft.).

Savings Data and Calculations

We followed the same approach to calculate savings as we did to calculate LEED expenditures. Using the number of square feet certified from 2000–2008, and the number of square feet forecasted to be certified from 2009–2013, we multiplied the number of square feet certified by the savings we calculated as part of the meta-analysis. We identified four categories of savings: energy, O&M, water, and trash. Based on the data from the meta-analysis, we calculated the following savings per square foot:

- Energy: $0.52 per square foot
- O&M: $0.32 per square foot
- Water: $0.05 per square foot
- Trash: $0.02 per square foot.

The savings attributable to O&M was higher than we expected, so we spent additional time validating this result. O&M savings include the labor time associated with maintaining HVAC systems or repairing condenser units. O&M savings also include janitorial and grounds-keeping activities, just as landscaping. For LEED-certified buildings that use natural vegetation, it is possible to realize significant savings from no longer using landscaping services. We concluded that the O&M estimates contained in the reports was valid and worth including in our analysis.

Allocate Spending and Savings Data to IMPLAN Sectors

Spending

Construction spending was assigned to 5 of the 440 economic sectors contained in the economic modeling tool. Four of the economic sectors identified pertain to construction of various new building

types, including commercial building, healthcare structures, manufacturing structures, nonresidential structures, and residential single and multi-family housing units. One economic sector captures renovations and improvements to nonresidential structures. The IMPLAN sectors identified are listed in Exhibit C-3.

Once the economic sectors were identified, we allocated spending into each sector. To do this, we examined the LEED database of certified buildings, which has data on the number of buildings certified to the LEED green building rating system, the associated square feet associated with each certified building, as well as the building type (e.g., healthcare, commercial, manufacturing, etc.). Exhibit C-4 shows how we used the LEED database of certified buildings to calculate how spending should be allocated for each IMPLAN code.

Savings

Green buildings generate savings for building owners by reducing demand for energy, water, trash removal, and O&M labor. For the purposes of calculating the number of net jobs created or retained, the value of savings reduces income for those impacted economic sectors. We conducted an analysis of several reports on the savings associated with green buildings. Based on our review of these studies, we calculated the average savings per square foot by savings category. The data is displayed in Exhibit C-5. To calculate the savings generated each year, we multiplied the cumulative square footage of green buildings for each year by the savings (per square foot) by savings category. The resulting values were assigned an IMPLAN code. The data in Exhibit C-6 and Exhibit C-7 shows how savings were allocated.

Net Impact by Economic Sector

The net impact by economic sector was calculated by subtracting the savings by economic sector from the spending by economic sector. Spending was assigned to five economic sectors (34, 35, 36, 37, and 39). Savings data was also assigned to five economic sectors (31, 33, 39, 390, 40). The net impact by IMPLAN sector is displayed in Exhibit C-8, Exhibit C-9, and Exhibit C-10.

Data

Exhibit C-1: Spending per Square Foot by Award Level

LEED Award	Spending per square foot
Certified	3.31
Gold	4.29
Silver	4.43
Platinum	No data available
Average	**$4.01**

Exhibit C-2: USGBC Share of Green Construction by Square Feet
(all dollar values in millions of $2008)

Year	USGBC Share of Green Construction	Square feet per year	Cumulative square footage
2000	$2.7	677,600	677,600
2001	$3.9	974,165	1,651,765
2002	$8.8	2,205,696	3,857,461
2003	$29.3	7,298,301	11,155,762
2004	$49.4	12,320,035	23,475,797
2005	$90.5	22,571,885	46,047,682
2006	$137.1	34,190,106	80,237,788
2007	$233.4	58,218,726	138,456,514
2008	$424.1	105,805,992	244,262,506
2009	$742.2	185,160,487	429,422,993
2010	$1,298.9	324,030,852	753,453,845
2011	$2,273.0	567,053,991	1,320,507,836
2012	$3,977.8	992,344,484	2,312,852,320
2013	$6,961.2	1,736,602,847	4,049,455,167

Exhibit C-3: LEED Spending by Economic Sector

SPENDING BY ECONOMIC SECTOR	Construction of new nonresidential commercial and health care structures	Construction of new nonresidential manufacturing structures	Construction of other new nonresidential structures	Construction of new residential permanent site single- and multi-family structures	Maintenance and repair construction of nonresidential maintenance and repair
IMPLAN Sector	34	35	36	37	39
Allocation by Sector	60%	7%	3%	7%	24%
2000	$1.6	$0.2	$0.1	$0.2	$0.6
2001	$2.3	$0.3	$0.1	$0.3	$0.9
2002	$5.3	$0.6	$0.2	$0.6	$2.1
2003	$17.5	$2.1	$0.8	$1.9	$6.9
2004	$29.6	$3.5	$1.4	$3.2	$11.7
2005	$54.3	$6.4	$2.5	$5.9	$21.4
2006	$82.2	$9.7	$3.9	$8.9	$32.4
2007	$139.9	$16.5	$6.6	$15.2	$55.2
2008	$254.3	$29.9	$11.9	$27.7	$100.2
2009	$445.1	$52.4	$20.9	$48.4	$175.4
2010	$778.9	$91.7	$36.5	$84.8	$307.0
2011	$1,363.1	$160.5	$64.0	$148.4	$537.2
2012	$2,385.4	$280.8	$111.9	$259.6	$940.1
2013	$4,174.4	$491.4	$195.9	$454.4	$1,645.2

Exhibit C-4: IMPLAN Sectors and Allocation

IMPLAN Sector	IMPLAN Code
Construction of new nonresidential commercial and health care structures	34
Construction of new nonresidential manufacturing structures	35
Construction of other new nonresidential structures	36
Construction of new residential permanent site single- and multi-family structures	37
Maintenance and repair construction of nonresidential maintenance and repair	39

Exhibit C-5: LEED Certified Buildings (by Square Feet), 2000–2008

LEED Certified Categories	Square feet	% of total	Equivalent IMPLAN Code
Nonresidential (commercial)	168,169,140	60%	34
Nonresidential (manufacturing)	19,798,410	7%	35
Nonresidential (other)	7,890,170	3%	36
New residential	22,213,072	8%	37
Maintanence and Repair (existing building)	66,276,714	24%	39
Total LEED certified square footage	***280,439,221***		

Exhibit C-6: LEED Savings by Economic Sector

SAVINGS BY ECONOMIC SECTOR	39 Maintenance and repair construction of nonresidential structures	40 Maintenance and repair construction of residential structures	390 Waste management and remediation services	33 Water, sewage and other systems	31 Electric power generation, transmission, and distribution
IMPLAN Sector	39	40	390	33	31
Allocation by Sector	35%	0%	2%	6%	56%
2000	$0.2	$0.0	$0.0	$0.0	$0.3
2001	$0.5	$0.0	$0.0	$0.1	$0.8
2002	$1.2	$0.0	$0.1	$0.2	$2.0
2003	$3.6	$0.0	$0.2	$0.6	$5.7
2004	$7.5	$0.1	$0.5	$1.3	$12.0
2005	$14.7	$0.1	$1.0	$2.5	$23.6
2006	$25.5	$0.2	$1.7	$4.4	$41.0
2007	$44.1	$0.3	$2.9	$7.6	$70.8
2008	$77.7	$0.6	$5.2	$13.3	$124.9
2009	$136.7	$1.1	$9.1	$23.5	$219.7
2010	$239.8	$1.9	$15.9	$41.2	$385.4
2011	$420.3	$3.3	$27.9	$72.1	$675.5
2012	$736.1	$5.7	$48.9	$126.3	$1,183.1
2013	$1,288.8	$10.0	$85.6	$221.2	$2,071.4

Exhibit C-7: Savings per Square Foot by Category

Savings Category	Savings (square foot)	% of Total Savings
Energy	$0.51	56%
O&M	$0.32	36%

Savings Category	Savings (square foot)	% of Total Savings
Water	$0.05	6%
Trash	$0.02	2%
Total	$0.91	100%

Source: Booz Allen analysis of 10 reports comprising 69 LEED certified buildings

Exhibit C-8: Savings Allocation by IMPLAN Sector

Savings Category	IMPLAN Category	IMPLAN Sector Code	Allocation by Sector
Energy	Electric power generation, transmission, and distribution	31	56%
O&M	Maintenance and repair construction of nonresidential structures	39	35%
O&M	Maintenance and repair construction of residential structures	40	<1%
Water	Water, sewage and other systems	33	6%
Waste	Waste management and remediation services	390	2%

Exhibit C-9: USGBC LEED Certification Net Impact by Economic Sector

NET IMPACT BY ECONOMIC SECTOR	34 Construction of new nonresidential commercial and health care structures	35 Construction of new nonresidential manufacturing structures	36 Construction of other new nonresidential structures	37 Construction of new residential permanent site single- and multi-family structures	39 Maintenance and repair construction of nonresidential maintenance and repair	40 Maintenance and repair construction of residential structures	390 Waste management and remediation services	33 Water, sewage and other systems	31 Electric power generation, transmission, and distribution	Net	NET ECONOMIC IMPACT BY YEAR
IMPLAN Sector	34	35	36	37	39	40	390	33	31		
2000	$1.6	$0.2	$0.1	$0.2	$0.4	$0.0	$0.0	$0.0	-$0.3	$2.5	$2.1
2001	$2.3	$0.3	$0.1	$0.3	$0.4	$0.0	$0.0	-$0.1	-$0.8	$4.0	$2.4
2002	$5.3	$0.6	$0.2	$0.6	$0.9	$0.0	-$0.1	-$0.2	-$2.0	$9.0	$5.3
2003	$17.5	$2.1	$0.8	$1.9	$3.4	$0.0	-$0.2	-$0.6	-$5.7	$28.9	$19.1
2004	$29.6	$3.5	$1.4	$3.2	$4.2	-$0.1	-$0.5	-$1.3	-$12.0	$51.6	$28.1
2005	$54.3	$6.4	$2.5	$5.9	$6.7	-$0.1	-$1.0	-$2.5	-$23.6	$96.3	$48.7
2006	$82.2	$9.7	$3.9	$8.9	$6.9	-$0.2	-$1.7	-$4.4	-$41.0	$152.0	$64.2
2007	$139.9	$16.5	$6.6	$15.2	$11.1	-$0.3	-$2.9	-$7.6	-$70.8	$259.9	$107.7
2008	$254.3	$29.9	$11.9	$27.7	$22.5	-$0.6	-$5.2	-$13.3	-$124.9	$467.9	$202.3
2009	$445.1	$52.4	$20.9	$48.4	$38.7	-$1.1	-$9.1	-$23.5	-$219.7	$820.1	$352.3
2010	$778.9	$91.7	$36.5	$84.8	$67.2	-$1.9	-$15.9	-$41.2	-$385.4	$1,436.3	$614.7
2011	$1,363.1	$160.5	$64.0	$148.4	$116.9	-$3.3	-$27.9	-$72.1	-$675.5	$2,514.6	$1,074.0
2012	$2,385.4	$280.8	$111.9	$259.6	$204.0	-$5.7	-$48.9	-$126.3	-$1,183.1	$4,401.8	$1,877.7
2013	$4,174.4	$491.4	$195.9	$454.4	$356.4	-$10.0	-$85.6	-$221.2	-$2,071.4	$7,704.3	$3,284.2

Exhibit C-10: Net Impact by Economic Sector

NET IMPACT BY ECONOMIC SECTOR	IMPLAN Sector	Net Impact (2003$)
Electric power generation, transmission, and distribution	31	-$4.8B
Water, sewage and other systems	33	-$0.5B
Construction of new nonresidential commercial and health care structures	34	$9.7B
Construction of new nonresidential manufacturing structures	35	$1.1B
Construction of other new nonresidential structures	36	$0.5
Construction of new residential permanent site single- and multi-family structures	37	$1.1B
Maintenance and repair construction of nonresidential structures	39	$0.8B
Waste management and remediation services	390	-$0.2
Maintenance and repair construction of residential structures	40	<0.1B

Appendix D: IMPLAN Results for Green Construction

Economic impacts were simulated by running $1 million in output through for each of the nine categories into the appropriate IMPLAN Sector, which resulted in GDP, employment, and labor earnings impacts per $1 million in sales (see Exhibit D-1). These factors were then applied to the annual estimated value of green construction spending or savings by each category to account for green construction growth over time during the 2000 to 2013 study period. Next, the estimated economic impacts from green construction savings were subtracted from the expenditures (see Exhibit D-2 and Exhibit D-3).This resulted in an annual estimate of net total economic contribution, broken out by direct, indirect, and induced impacts, in terms of GDP, jobs and income, respectively, that are supported by the green construction market across the nation as summarized in Exhibit D-4 through Exhibit D-14.

Exhibit D-1: GDP, Employment and Labor Earning Impacts per $1 Million Dollars in Expenditures by Sector

Impact Metrics	34 Construction of new nonresidential commercial and health care structures	35 Construction of new nonresidential manufacturing structures	36 Construction of other new nonresidential structures	37 Construction of new residential permanent site single- and multi-family structures	39 Maintenance and repair construction of nonresidential structures
GDP					
Direct	442,017	529,484	450,864	360,376	494,095
Indirect	436,225	332,616	440,336	520,953	404,525
Induced	494,389	447,438	508,558	424,615	524,574
Employment					
Direct	7.9	8.0	8.3	5.1	9.9
Indirect	4.8	3.6	4.9	6.4	4.5
Induced	6.5	5.9	6.7	5.6	6.9
Labor Earnings					
Direct	402,020	405,593	418,545	260,783	474,063
Indirect	287,019	217,919	290,029	331,807	258,855
Induced	288,090	260,731	296,346	247,431	305,679

Impact Metrics	39 Maintenance and repair construction of nonresidential structures	40 Maintenance and repair construction of residential structures	390 Waste management and remediation services	33 Water, sewage and other systems	31 Electric power generation, transmission, and distribution
GDP					
Direct	494,095	477,849	472,335	716,279	706,844
Indirect	404,525	424,848	417,502	254,702	196,327
Induced	524,574	360,309	405,079	446,608	230,914
Employment					
Direct	9.9	1.8	5.0	4.8	1.2
Indirect	4.5	5.1	5.0	3.3	1.8
Induced	6.9	4.7	5.3	5.9	3.0
Labor Earnings					
Direct	474,063	225,710	295,569	437,095	203,209
Indirect	258,855	268,792	273,164	182,394	116,885
Induced	305,679	209,959	236,047	260,247	134,558

Exhibit D-2: Annual Green Construction Expenditure Economic Impacts In Terms of GDP, Employment, and Labor Earnings

Green Construction Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Combined Annual Economic Spending Impact	2000	2081.7	1952.1	2258.3	37519	21719	29707	1876.6	1273.0	1315.9
	2001	2381.0	2232.8	2583.0	42914	24842	33978	2146.4	1456.0	1505.2
	2002	2646.2	2481.4	2870.6	47693	27609	37762	2385.4	1618.2	1672.8
	2003	3071.9	2880.6	3332.4	55365	32050	43837	2769.2	1878.5	1941.9
	2004	3753.4	3519.7	4071.8	67649	39161	53563	3383.6	2295.2	2372.7
	2005	4567.1	4282.8	4954.5	82315	47651	65175	4117.1	2792.8	2887.1
	2006	7953.7	7458.5	8628.4	143352	82985	113503	7169.9	4863.7	5027.9
	2007	12833.7	12034.7	13922.4	231307	133901	183143	11569.1	7847.9	8112.8
	2008	19091.5	17902.8	20711.0	344094	199191	272445	17210.3	11674.6	12068.7
	2009	23597.1	22127.9	25598.8	425300	246201	336742	21271.9	14429.8	14916.9
	2010	29166.0	27350.1	31640.1	525671	304304	416213	26292.1	17835.2	18437.3
	2011	36049.2	33804.7	39107.2	649729	376120	514439	32497.0	22044.3	22788.5
	2012	44556.8	41782.6	48336.5	803065	464884	635846	40166.3	27246.8	28166.6
	2013	55072.2	51643.3	59743.9	992588	574597	785906	49645.6	33677.1	34813.9
	Total	246821.3	231453.9	267758.8	4448561	2575215	3522257	222500.5	150933.2	156028.2

Exhibit D-3: Annual Green Construction Savings Economic Impacts In Terms of GDP, Employment, and Labor Earnings

Green Construction Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Combined Annual Economic Savings Impact	2000	20.7	9.2	11.6	150	96	152	10.4	5.8	6.8
	2001	44.4	19.7	24.9	322	207	325	22.2	12.4	14.5
	2002	70.6	31.4	39.6	514	329	518	35.4	19.7	23.1
	2003	101.2	45.0	56.7	735	471	743	50.8	28.2	33.0
	2004	138.5	61.6	77.6	1007	645	1016	69.5	38.6	45.2
	2005	183.9	81.7	103.0	1337	857	1349	92.2	51.2	60.0
	2006	262.9	116.9	147.3	1911	1225	1929	131.9	73.3	85.9
	2007	390.5	173.6	218.8	2838	1819	2865	195.9	108.8	127.5
	2008	580.2	257.9	325.1	4217	2703	4258	291.1	161.7	189.5
	2009	814.7	362.1	456.5	5922	3796	5979	408.7	227.0	266.0
	2010	1104.6	491.0	619.0	8029	5146	8106	554.1	307.8	360.7
	2011	1462.8	650.2	819.7	10633	6815	10735	733.8	407.6	477.7
	2012	1905.6	847.0	1067.9	13852	8878	13985	956.0	531.0	622.3
	2013	2453.0	1090.3	1374.6	17831	11428	18001	1230.6	683.5	801.0
	Total	9533.5	4237.4	5342.3	69299	44416	69962	4782.6	2656.4	3113.1

Exhibit D-4: Total Net Green Construction Economic Impacts In Terms of GDP, Employment, and Labor Earnings

Green Construction Net Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Net Annual Economic Impact (Spending - Savings)	2000	2061.0	1942.9	2246.7	37369	21623	29555	1866.2	1267.2	1309.2
	2001	2336.7	2213.1	2558.1	42591	24636	33653	2124.1	1443.6	1490.7
	2002	2575.5	2450.0	2831.1	47180	27280	37244	2350.0	1598.5	1649.7
	2003	2970.7	2835.6	3275.8	54630	31579	43094	2718.4	1850.3	1908.8
	2004	3614.9	3458.2	3994.2	66643	38516	52547	3314.1	2256.7	2327.5
	2005	4383.2	4201.0	4851.5	80978	46794	63826	4024.8	2741.6	2827.1
	2006	7690.8	7341.6	8481.0	141441	81760	111573	7038.1	4790.5	4942.1
	2007	12443.2	11861.1	13703.6	228469	132082	180278	11373.2	7739.1	7985.3
	2008	18511.3	17644.9	20385.9	339876	196488	268187	16919.2	11512.9	11879.2
	2009	22782.4	21765.8	25142.2	419378	242405	330763	20863.2	14202.8	14650.9
	2010	28061.4	26859.1	31021.1	517641	299158	408107	25738.0	17527.5	18076.6
	2011	34586.3	33154.5	38287.4	639096	369304	503704	31763.2	21636.8	22310.8
	2012	42651.1	40935.6	47268.6	789213	456006	621862	39210.3	26715.8	27544.3
	2013	52619.2	50553.0	58369.3	974758	563168	767905	48415.0	32993.6	34012.9
	Total	237287.8	227216.5	262416.5	4379262	2530799	3452295	217717.9	148276.8	152915.1

By IMPLAN Industry

Spending:

Exhibit D-5: Green Construction Sector 34 Spending Impact

Green Construction Sector 34 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of new non-residential commercial and health care structures	2000	1211.6	1195.7	1355.1	21654.0	13156.8	17816.6	1101.9	786.7	789.7
	2001	1385.8	1367.6	1550.0	24767.6	15048.7	20378.4	1260.4	899.8	903.2
	2002	1540.1	1519.9	1722.6	27525.9	16724.6	22647.9	1400.8	1000.1	1003.8
	2003	1787.9	1764.4	1999.7	31954.0	19415.1	26291.3	1626.1	1160.9	1165.3
	2004	2184.6	2155.9	2443.4	39043.6	23722.7	32124.5	1986.9	1418.5	1423.8
	2005	2658.1	2623.3	2973.1	47507.7	28865.5	39088.6	2417.6	1726.0	1732.5
	2006	4629.2	4568.5	5177.6	82735.2	50269.5	68073.3	4210.3	3005.9	3017.1
	2007	7469.4	7371.5	8354.4	133498.0	81112.7	109840.1	6793.5	4850.2	4868.3
	2008	11111.5	10965.9	12428.1	198592.4	120663.7	163398.8	10106.1	7215.2	7242.1
	2009	13733.9	13553.9	15361.1	245460.2	149140.4	201960.9	12491.1	8917.9	8951.2
	2010	16975.1	16752.6	18986.3	303388.8	184337.5	249623.7	15439.0	11022.6	11063.7
	2011	20981.2	20706.3	23467.1	374988.5	227841.1	308534.9	19082.6	13623.9	13674.7
	2012	25932.7	25592.9	29005.4	463485.8	281611.7	381349.1	23586.1	16839.1	16902.0
	2013	32052.9	31632.9	35850.6	572868.5	348072.0	471347.5	29152.5	20813.2	20890.8

Exhibit D-6: Green Construction Sector 35 Spending Impact

Green Construction Sector 35 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of new non-residential manufacturing structures	2000	170.9	107.3	144.4	2581.6	1161.7	1903.9	130.9	70.3	84.1
	2001	195.4	122.8	165.1	2952.8	1328.7	2177.7	149.7	80.4	96.2
	2002	217.2	136.4	183.5	3281.6	1476.7	2420.2	166.4	89.4	107.0
	2003	252.1	158.4	213.1	3809.5	1714.3	2809.5	193.1	103.8	124.2
	2004	308.1	193.5	260.3	4654.8	2094.6	3432.9	236.0	126.8	151.7
	2005	374.9	235.5	316.8	5663.8	2548.7	4177.1	287.2	154.3	184.6
	2006	652.8	410.1	551.7	9863.6	4438.6	7274.4	500.1	268.7	321.5
	2007	1053.4	661.7	890.2	15915.6	7162.0	11737.7	806.9	433.5	518.7
	2008	1567.0	984.4	1324.2	23676.1	10654.2	17461.1	1200.4	644.9	771.6
	2009	1936.8	1216.7	1636.7	29263.6	13168.6	21581.9	1483.6	797.1	953.7
	2010	2393.9	1503.8	2023.0	36169.8	16276.4	26675.2	1833.8	985.3	1178.8
	2011	2958.9	1858.7	2500.4	44705.9	20117.7	32970.6	2266.6	1217.8	1457.0
	2012	3657.2	2297.4	3090.5	55256.5	24865.4	40751.7	2801.5	1505.2	1800.9
	2013	4520.3	2839.6	3819.8	68297.0	30733.7	50369.1	3462.6	1860.4	2225.9

Exhibit D-7: Green Construction Sector 36 Spending Impact

Green Construction Sector 36 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of other new nonresidential structures	2000	58.0	56.6	65.4	1067.4	630.2	861.6	53.8	37.3	38.1
	2001	66.3	64.8	74.8	1220.9	720.8	985.5	61.6	42.7	43.6
	2002	73.7	72.0	83.1	1356.9	801.0	1095.3	68.4	47.4	48.4
	2003	85.6	83.6	96.5	1575.1	929.9	1271.5	79.4	55.0	56.2
	2004	104.5	102.1	117.9	1924.6	1136.2	1553.6	97.1	67.3	68.7
	2005	127.2	124.2	143.5	2341.8	1382.5	1890.4	118.1	81.8	83.6
	2006	221.5	216.4	249.9	4078.3	2407.7	3292.1	205.7	142.5	145.6
	2007	357.5	349.1	403.2	6580.6	3884.9	5312.1	331.8	229.9	235.0
	2008	531.8	519.3	599.8	9789.3	5779.3	7902.2	493.6	342.1	349.5
	2009	657.3	641.9	741.4	12099.6	7143.2	9767.2	610.1	422.8	432.0
	2010	812.4	793.4	916.3	14955.1	8828.9	12072.2	754.1	522.6	534.0
	2011	1004.1	980.7	1132.6	18484.6	10912.6	14921.3	932.1	645.9	660.0
	2012	1241.1	1212.1	1399.9	22846.9	13487.9	18442.7	1152.1	798.3	815.7
	2013	1534.0	1498.1	1730.2	28238.8	16671.1	22795.2	1424.0	986.8	1008.2

Exhibit D-8: Green Construction Sector 37 Spending Impact

Green Construction Sector 37 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of new residential permanent site single- and multi-family structures	2000	107.5	155.4	126.7	1521.6	1909.5	1670.8	77.8	99.0	73.8
	2001	123.0	177.8	144.9	1740.4	2184.0	1911.0	89.0	113.2	84.4
	2002	136.7	197.6	161.0	1934.2	2427.2	2123.8	98.9	125.8	93.8
	2003	158.7	229.4	186.9	2245.4	2817.7	2465.5	114.8	146.1	108.9
	2004	193.9	280.2	228.4	2743.5	3442.9	3012.5	140.3	178.5	133.1
	2005	235.9	341.0	277.9	3338.3	4189.2	3665.6	170.7	217.2	162.0
	2006	410.8	593.9	484.0	5813.7	7295.6	6383.7	297.3	378.2	282.1
	2007	662.9	958.2	781.0	9380.7	11771.9	10300.4	479.7	610.3	455.1
	2008	986.1	1425.5	1161.8	13954.8	17511.9	15322.9	713.6	907.9	677.0
	2009	1218.8	1761.9	1436.0	17248.2	21644.7	18939.1	882.0	1122.2	836.8
	2010	1506.4	2177.7	1775.0	21318.7	26752.9	23408.8	1090.1	1387.0	1034.3
	2011	1861.9	2691.6	2193.8	26349.9	33066.6	28933.3	1347.4	1714.3	1278.4
	2012	2301.4	3326.8	2711.6	32568.5	40870.3	35761.5	1665.4	2118.9	1580.1
	2013	2844.5	4111.9	3351.5	40254.7	50515.7	44201.2	2058.4	2619.0	1953.0

Exhibit D-9: Green Construction Sector 39 Spending Impact

Green Construction Sector 39 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Maintenance and repair construction of nonresidential structures	2000	533.7	437.0	566.7	10694.5	4861.1	7453.7	512.1	279.6	330.2
	2001	610.5	499.8	648.2	12232.3	5560.1	8525.5	585.7	319.8	377.7
	2002	678.5	555.5	720.3	13594.5	6179.3	9475.0	651.0	355.5	419.8
	2003	787.6	644.8	836.2	15781.5	7173.4	10999.2	755.7	412.6	487.3
	2004	962.4	787.9	1021.8	19282.9	8765.0	13439.6	923.4	504.2	595.4
	2005	1171.0	958.7	1243.3	23463.2	10665.1	16353.1	1123.5	613.5	724.5
	2006	2039.3	1669.6	2165.1	40861.4	18573.4	28479.2	1956.7	1068.4	1261.7
	2007	3290.6	2694.1	3493.6	65932.2	29969.2	45952.7	3157.2	1723.9	2035.8
	2008	4895.1	4007.7	5197.1	98081.1	44582.3	68359.6	4696.6	2564.5	3028.4
	2009	6050.3	4953.5	6423.6	121228.2	55103.7	84492.4	5805.0	3169.8	3743.1
	2010	7478.2	6122.6	7939.5	149838.1	68108.2	104432.6	7175.0	3917.8	4626.5
	2011	9243.1	7567.5	9813.2	185199.9	84181.8	129078.7	8868.3	4842.4	5718.4
	2012	11424.4	9353.4	12129.2	228907.1	104048.7	159541.3	10961.3	5985.2	7067.9
	2013	14120.6	11560.8	14991.6	282929.2	128604.2	197193.1	13548.1	7397.7	8735.9

Savings:

Exhibit D-10: Green Construction Sector 39 Savings Impact

Green Construction Sector 39 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Maintenance and repair construction of nonresidential structures	2000	5.7	4.7	6.1	114.5	52.1	79.8	5.5	3.0	3.5
	2001	12.3	10.0	13.0	245.5	111.6	171.1	11.8	6.4	7.6
	2002	19.5	16.0	20.7	391.1	177.8	272.6	18.7	10.2	12.1
	2003	28.0	22.9	29.7	560.1	254.6	390.4	26.8	14.6	17.3
	2004	38.3	31.3	40.6	766.7	348.5	534.3	36.7	20.0	23.7
	2005	50.8	41.6	53.9	1017.9	462.7	709.5	48.7	26.6	31.4
	2006	72.6	59.5	77.1	1455.6	661.6	1014.5	69.7	38.1	44.9
	2007	107.9	88.3	114.5	2161.7	982.6	1506.6	103.5	56.5	66.7
	2008	160.3	131.2	170.2	3212.1	1460.0	2238.7	153.8	84.0	99.2
	2009	225.1	184.3	239.0	4510.4	2050.2	3143.6	216.0	117.9	139.3
	2010	305.2	249.9	324.0	6115.1	2779.6	4262.1	292.8	159.9	188.8
	2011	404.2	330.9	429.1	8098.6	3681.2	5644.5	387.8	211.8	250.1
	2012	526.5	431.1	559.0	10550.1	4795.5	7353.1	505.2	275.9	325.8
	2013	677.8	554.9	719.6	13580.2	6172.8	9465.0	650.3	355.1	419.3

Exhibit D-11: Green Construction Sector 40 Savings Impact

Green Construction Sector 40 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Maintenance and repair construction of residential structures	2000	0.0	0.0	0.0	0.2	0.5	0.4	0.0	0.0	0.0
	2001	0.1	0.1	0.1	0.3	1.0	0.9	0.0	0.1	0.0
	2002	0.1	0.1	0.1	0.6	1.6	1.4	0.1	0.1	0.1
	2003	0.2	0.2	0.2	0.8	2.2	2.1	0.1	0.1	0.1
	2004	0.3	0.3	0.2	1.1	3.1	2.8	0.1	0.2	0.1
	2005	0.4	0.3	0.3	1.4	4.1	3.8	0.2	0.2	0.2
	2006	0.5	0.5	0.4	2.1	5.8	5.4	0.3	0.3	0.2
	2007	0.8	0.7	0.6	3.1	8.7	8.0	0.4	0.5	0.4
	2008	1.2	1.1	0.9	4.5	12.9	11.9	0.6	0.7	0.5
	2009	1.7	1.5	1.3	6.4	18.1	16.7	0.8	1.0	0.7
	2010	2.3	2.0	1.7	8.7	24.5	22.6	1.1	1.3	1.0
	2011	3.0	2.7	2.3	11.5	32.5	29.9	1.4	1.7	1.3
	2012	4.0	3.5	3.0	14.9	42.3	39.0	1.9	2.2	1.7
	2013	5.1	4.5	3.8	19.2	54.5	50.2	2.4	2.9	2.2

Exhibit D-12: Green Construction Sector 390 Savings Impact

Green Construction Sector 390 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Waste management and remediation services	2000	0.4	0.3	0.3	3.8	3.8	4.1	0.2	0.2	0.2
	2001	0.8	0.7	0.7	8.2	8.2	8.7	0.5	0.4	0.4
	2002	1.2	1.1	1.1	13.1	13.1	13.9	0.8	0.7	0.6
	2003	1.8	1.6	1.5	18.8	18.8	19.9	1.1	1.0	0.9
	2004	2.4	2.1	2.1	25.7	25.7	27.3	1.5	1.4	1.2
	2005	3.2	2.9	2.8	34.1	34.1	36.2	2.0	1.9	1.6
	2006	4.6	4.1	4.0	48.8	48.8	51.7	2.9	2.7	2.3
	2007	6.8	6.1	5.9	72.5	72.5	76.8	4.3	4.0	3.4
	2008	10.2	9.0	8.7	107.7	107.7	114.2	6.4	5.9	5.1
	2009	14.3	12.6	12.3	151.3	151.3	160.3	8.9	8.3	7.1
	2010	19.4	17.1	16.6	205.1	205.1	217.4	12.1	11.2	9.7
	2011	25.7	22.7	22.0	271.6	271.6	287.9	16.1	14.8	12.8
	2012	33.4	29.5	28.7	353.8	353.8	375.0	20.9	19.3	16.7
	2013	43.0	38.0	36.9	455.4	455.4	482.8	26.9	24.9	21.5

Exhibit D-13: Green Construction Sector 33 Savings Impact

Green Construction Sector 33 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Water, sewage and other systems	2000	1.4	0.5	0.9	9.5	6.6	11.7	0.9	0.4	0.5
	2001	3.0	1.1	1.9	20.4	14.0	25.1	1.9	0.8	1.1
	2002	4.9	1.7	3.0	32.5	22.4	40.0	3.0	1.2	1.8
	2003	7.0	2.5	4.3	46.6	32.0	57.3	4.2	1.8	2.5
	2004	9.5	3.4	5.9	63.8	43.9	78.4	5.8	2.4	3.5
	2005	12.6	4.5	7.9	84.7	58.2	104.1	7.7	3.2	4.6
	2006	18.1	6.4	11.3	121.1	83.3	148.9	11.0	4.6	6.6
	2007	26.8	9.5	16.7	179.9	123.7	221.1	16.4	6.8	9.8
	2008	39.9	14.2	24.9	267.3	183.8	328.5	24.3	10.2	14.5
	2009	56.0	19.9	34.9	375.3	258.0	461.3	34.2	14.3	20.3
	2010	75.9	27.0	47.3	508.9	349.8	625.5	46.3	19.3	27.6
	2011	100.6	35.8	62.7	673.9	463.3	828.4	61.4	25.6	36.5
	2012	131.0	46.6	81.7	877.9	603.6	1079.1	79.9	33.4	47.6
	2013	168.6	60.0	105.1	1130.1	776.9	1389.0	102.9	42.9	61.3

Exhibit D-14: Green Construction Sector 31 Savings Impact

Green Construction Sector 31 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Electric power generation, transmission, and distribution	2000	13.1	3.7	4.3	22.3	33.5	55.8	3.8	2.2	2.5
	2001	28.2	7.8	9.2	47.8	71.8	119.6	8.1	4.7	5.4
	2002	44.9	12.5	14.7	76.2	114.3	190.5	12.9	7.4	8.5
	2003	64.3	17.9	21.0	109.1	163.7	272.8	18.5	10.6	12.2
	2004	88.0	24.4	28.7	149.4	224.0	373.4	25.3	14.5	16.7
	2005	116.8	32.4	38.2	198.3	297.5	495.8	33.6	19.3	22.2
	2006	167.0	46.4	54.6	283.6	425.4	708.9	48.0	27.6	31.8
	2007	248.1	68.9	81.0	421.1	631.7	1052.9	71.3	41.0	47.2
	2008	368.6	102.4	120.4	625.8	938.7	1564.5	106.0	61.0	70.2
	2009	517.6	143.8	169.1	878.7	1318.1	2196.8	148.8	85.6	98.5
	2010	701.8	194.9	229.3	1191.4	1787.0	2978.4	201.7	116.0	133.6
	2011	929.4	258.1	303.6	1577.8	2366.7	3944.5	267.2	153.7	176.9
	2012	1210.7	336.3	395.5	2055.4	3083.1	5138.5	348.1	200.2	230.5
	2013	1558.4	432.9	509.1	2645.7	3968.6	6614.3	448.0	257.7	296.7

Appendix E: IMPLAN Results for USGBC Impact

Similar to the green construction analysis, economic impacts from LEED certification construction were simulated by running $1 million in output through for each of the nine categories into the appropriate IMPLAN Sector, which resulted in GDP, employment, and labor earnings impacts per $1 million in sales (Exhibit D-1 in Appendix D). These factors were then applied to the annual estimated value of LEED certification expenditures or savings by each category to account for increased demand for LEED certification over time from 2000 to 2013. Next, the estimated economic impacts from LEED certification savings were subtracted from the expenditures (see Exhibit E-1and Exhibit E-2This resulted in an annual estimate of net total economic contribution, broken out by direct, indirect, and induced impacts, in terms of GDP, jobs and income, respectively, that are supported by LEED certification construction for the US as summarized in Exhibit E-3 through Exhibit E-13.

Exhibit E-1: Annual Economic Impacts for LEED Certification Expenditure in Terms of GDP, Employment, and Labor Earnings

USGBC LEED Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Combined Annual Economic Spending Impact	2000	1.4	1.3	1.5	26	15	20	1.3	0.9	0.9
	2001	2.0	1.9	2.2	37	21	29	1.8	1.3	1.3
	2002	4.6	4.3	5.0	84	48	66	4.2	2.8	2.9
	2003	15.3	14.4	16.6	277	160	219	13.8	9.4	9.7
	2004	25.9	24.3	28.1	467	270	370	23.3	15.8	16.4
	2005	47.5	44.5	51.5	855	495	677	42.8	29.0	30.0
	2006	71.9	67.4	78.0	1295	750	1026	64.8	44.0	45.4
	2007	122.4	114.8	132.8	2206	1277	1747	110.3	74.8	77.4
	2008	222.4	208.6	241.3	4009	2321	3174	200.5	136.0	140.6
	2009	389.3	365.0	422.3	7016	4061	5555	350.9	238.0	246.1
	2010	681.2	638.8	739.0	12277	7107	9721	614.1	416.6	430.6
	2011	1192.1	1117.9	1293.2	21485	12438	17012	1074.6	729.0	753.6
	2012	2086.1	1956.3	2263.1	37599	21766	29770	1880.6	1275.7	1318.8
	2013	3650.7	3423.4	3960.4	65799	38090	52098	3291.0	2232.5	2307.8
	Total	8512.9	7982.9	9235.0	153431	88819	121483	7674.1	5205.7	5381.4

Exhibit E-2: Annual Economic Impacts for LEED Certification Savings in Terms of GDP, Employment, and Labor Earnings

USGBC LEED Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Combined Annual Economic Savings Impact	2000	0.4	0.2	0.2	3	2	3	0.2	0.1	0.1
	2001	1.1	0.5	0.6	8	5	8	0.5	0.3	0.4
	2002	2.5	1.1	1.4	18	12	19	1.3	0.7	0.8
	2003	7.3	3.2	4.1	53	34	54	3.7	2.0	2.4
	2004	15.4	6.8	8.6	112	72	113	7.7	4.3	5.0
	2005	30.2	13.4	16.9	219	141	221	15.1	8.4	9.9
	2006	52.6	23.4	29.5	382	245	386	26.4	14.7	17.2
	2007	90.7	40.3	50.8	660	423	666	45.5	25.3	29.6
	2008	160.1	71.2	89.7	1164	746	1175	80.3	44.6	52.3
	2009	281.4	125.1	157.7	2046	1311	2065	141.2	78.4	91.9
	2010	493.8	219.5	276.7	3589	2301	3624	247.7	137.6	161.2
	2011	865.4	384.7	485.0	6291	4032	6351	434.1	241.1	282.6
	2012	1515.8	673.7	849.4	11018	7062	11124	760.4	422.3	495.0
	2013	2653.9	1179.6	1487.2	19291	12364	19476	1331.3	739.5	866.6
	Total	6170.6	2742.7	3457.8	44854	28748	45283	3095.5	1719.3	2014.9

Exhibit E-3: Total Net Green Construction Economic Impacts in Terms of GDP, Employment, and Labor Earnings

USGBC LEED Net Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Net Annual Economic Impact (Spending - Savings)	2000	1.0	1.1	1.3	22	13	17	1.1	0.7	0.8
	2001	1.0	1.4	1.6	29	16	21	1.3	1.0	0.9
	2002	2.1	3.2	3.6	65	37	48	2.9	2.1	2.1
	2003	8.0	11.1	12.5	223	126	165	10.2	7.3	7.3
	2004	10.5	17.4	19.5	355	199	257	15.6	11.6	11.3
	2005	17.3	31.1	34.6	636	354	456	27.6	20.6	20.1
	2006	19.3	44.0	48.5	913	505	640	38.4	29.3	28.3
	2007	31.7	74.4	81.9	1546	854	1081	64.8	49.6	47.7
	2008	62.3	137.4	151.6	2845	1575	1999	120.2	91.4	88.3
	2009	107.8	239.9	264.6	4970	2750	3490	209.7	159.6	154.2
	2010	187.4	419.3	462.3	8688	4807	6097	366.4	279.0	269.4
	2011	326.7	733.2	808.2	15195	8406	10661	640.5	487.8	471.0
	2012	570.4	1282.5	1413.7	26581	14704	18647	1120.2	853.3	823.8
	2013	996.9	2243.9	2473.3	46508	25726	32622	1959.7	1493.0	1441.2
	Total	2342.3	5240.2	5777.2	108577	60071	76200	4578.5	3486.4	3366.5

By IMPLAN Sector

Spending:

Exhibit E-4: USGBC LEED Sector 34 Spending Impact

USGBC LEED Sector 34 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of new non-residential commercial and health care structures	2000	0.8	0.8	0.9	14.8	9.0	12.2	0.8	0.5	0.5
	2001	1.2	1.2	1.3	21.3	12.9	17.5	1.1	0.8	0.8
	2002	2.7	2.7	3.0	48.2	29.3	39.7	2.5	1.8	1.8
	2003	8.9	8.8	10.0	159.6	97.0	131.3	8.1	5.8	5.8
	2004	15.1	14.9	16.9	269.4	163.7	221.7	13.7	9.8	9.8
	2005	27.6	27.3	30.9	493.6	299.9	406.1	25.1	17.9	18.0
	2006	41.8	41.3	46.8	747.7	454.3	615.2	38.0	27.2	27.3
	2007	71.2	70.3	79.7	1273.1	773.5	1047.5	64.8	46.3	46.4
	2008	129.5	127.8	144.8	2313.7	1405.8	1903.7	117.7	84.1	84.4
	2009	226.5	223.6	253.4	4049.0	2460.2	3331.5	206.0	147.1	147.7
	2010	396.5	391.3	443.4	7085.8	4305.3	5830.1	360.6	257.4	258.4
	2011	693.8	684.7	776.0	12400.2	7534.3	10202.7	631.0	450.5	452.2
	2012	1214.2	1198.3	1358.0	21700.3	13185.0	17854.7	1104.3	788.4	791.3
	2013	2124.8	2096.9	2376.5	37975.5	23073.7	31245.7	1932.5	1379.7	1384.9

Exhibit E-5: USGBC LEED Sector 35 Spending Impact

USGBC LEED Sector 35 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of new non-residential manufacturing structures	2000	0.1	0.1	0.1	1.8	0.8	1.3	0.1	0.0	0.1
	2001	0.2	0.1	0.1	2.5	1.1	1.9	0.1	0.1	0.1
	2002	0.4	0.2	0.3	5.8	2.6	4.2	0.3	0.2	0.2
	2003	1.3	0.8	1.1	19.0	8.6	14.0	1.0	0.5	0.6
	2004	2.1	1.3	1.8	32.1	14.5	23.7	1.6	0.9	1.0
	2005	3.9	2.4	3.3	58.8	26.5	43.4	3.0	1.6	1.9
	2006	5.9	3.7	5.0	89.1	40.1	65.7	4.5	2.4	2.9
	2007	10.0	6.3	8.5	151.8	68.3	111.9	7.7	4.1	4.9
	2008	18.3	11.5	15.4	275.8	124.1	203.4	14.0	7.5	9.0
	2009	31.9	20.1	27.0	482.7	217.2	356.0	24.5	13.1	15.7
	2010	55.9	35.1	47.2	844.8	380.1	623.0	42.8	23.0	27.5
	2011	97.8	61.5	82.7	1478.3	665.3	1090.3	75.0	40.3	48.2
	2012	171.2	107.6	144.7	2587.1	1164.2	1908.0	131.2	70.5	84.3
	2013	299.6	188.2	253.2	4527.4	2037.3	3339.0	229.5	123.3	147.6

Exhibit E-6: USGBC LEED Sector 36 Spending Impact

USGBC LEED Sector 36 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of other new nonresidential structures	2000	0.0	0.0	0.0	0.7	0.4	0.6	0.0	0.0	0.0
	2001	0.1	0.1	0.1	1.1	0.6	0.8	0.1	0.0	0.0
	2002	0.1	0.1	0.1	2.4	1.4	1.9	0.1	0.1	0.1
	2003	0.4	0.4	0.5	7.9	4.6	6.4	0.4	0.3	0.3
	2004	0.7	0.7	0.8	13.3	7.8	10.7	0.7	0.5	0.5
	2005	1.3	1.3	1.5	24.3	14.4	19.6	1.2	0.9	0.9
	2006	2.0	2.0	2.3	36.9	21.8	29.8	1.9	1.3	1.3
	2007	3.4	3.3	3.8	62.8	37.0	50.7	3.2	2.2	2.2
	2008	6.2	6.1	7.0	114.1	67.3	92.1	5.8	4.0	4.1
	2009	10.8	10.6	12.2	199.6	117.8	161.1	10.1	7.0	7.1
	2010	19.0	18.5	21.4	349.3	206.2	282.0	17.6	12.2	12.5
	2011	33.2	32.4	37.5	611.2	360.9	493.4	30.8	21.4	21.8
	2012	58.1	56.7	65.5	1069.7	631.5	863.5	53.9	37.4	38.2
	2013	101.7	99.3	114.7	1872.0	1105.1	1511.1	94.4	65.4	66.8

Exhibit E-7: USGBC LEED Sector 37 Spending Impact

USGBC LEED Sector 37 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Construction of new residential permanent site single- and multi-family structures	2000	0.1	0.1	0.1	1.0	1.3	1.1	0.1	0.1	0.1
	2001	0.1	0.2	0.1	1.5	1.9	1.6	0.1	0.1	0.1
	2002	0.2	0.3	0.3	3.4	4.3	3.7	0.2	0.2	0.2
	2003	0.8	1.1	0.9	11.2	14.1	12.3	0.6	0.7	0.5
	2004	1.3	1.9	1.6	18.9	23.8	20.8	1.0	1.2	0.9
	2005	2.5	3.5	2.9	34.7	43.5	38.1	1.8	2.3	1.7
	2006	3.7	5.4	4.4	52.5	65.9	57.7	2.7	3.4	2.5
	2007	6.3	9.1	7.4	89.5	112.3	98.2	4.6	5.8	4.3
	2008	11.5	16.6	13.5	162.6	204.0	178.5	8.3	10.6	7.9
	2009	20.1	29.1	23.7	284.5	357.0	312.4	14.5	18.5	13.8
	2010	35.2	50.9	41.5	497.9	624.8	546.7	25.5	32.4	24.2
	2011	61.6	89.0	72.5	871.3	1093.4	956.8	44.6	56.7	42.3
	2012	107.7	155.8	127.0	1524.9	1913.5	1674.3	78.0	99.2	74.0
	2013	188.6	272.6	222.2	2668.5	3348.7	2930.1	136.5	173.6	129.5

Exhibit E-8: USGBC LEED Sector 39 Spending Impact

USGBC LEED Sector 39 Spending Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Spending Impact on Maintenance and repair construction of nonresidential structures	2000	0.4	0.3	0.4	7.3	3.3	5.1	0.4	0.2	0.2
	2001	0.5	0.4	0.6	10.5	4.8	7.3	0.5	0.3	0.3
	2002	1.2	1.0	1.3	23.8	10.8	16.6	1.1	0.6	0.7
	2003	3.9	3.2	4.2	78.8	35.8	54.9	3.8	2.1	2.4
	2004	6.6	5.4	7.1	133.1	60.5	92.7	6.4	3.5	4.1
	2005	12.2	10.0	12.9	243.8	110.8	169.9	11.7	6.4	7.5
	2006	18.4	15.1	19.6	369.3	167.8	257.4	17.7	9.7	11.4
	2007	31.4	25.7	33.3	628.8	285.8	438.2	30.1	16.4	19.4
	2008	57.0	46.7	60.5	1142.7	519.4	796.4	54.7	29.9	35.3
	2009	99.8	81.7	106.0	1999.7	909.0	1393.8	95.8	52.3	61.7
	2010	174.7	143.0	185.4	3499.6	1590.7	2439.1	167.6	91.5	108.1
	2011	305.7	250.2	324.5	6124.2	2783.7	4268.4	293.3	160.1	189.1
	2012	534.9	437.9	567.9	10717.4	4871.5	7469.7	513.2	280.2	330.9
	2013	936.1	766.4	993.8	18755.4	8525.2	13072.0	898.1	490.4	579.1

Savings:

Exhibit E-9: USGBC LEED Sector 39 Savings Impact

USGBC LEED Sector 39 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Maintenance and repair construction of nonresidential structures	2000	0.1	0.1	0.1	2.5	1.1	1.7	0.1	0.1	0.1
	2001	0.3	0.2	0.3	6.0	2.7	4.2	0.3	0.2	0.2
	2002	0.7	0.6	0.7	14.0	6.4	9.8	0.7	0.4	0.4
	2003	2.0	1.7	2.1	40.5	18.4	28.2	1.9	1.1	1.2
	2004	4.3	3.5	4.5	85.2	38.7	59.4	4.1	2.2	2.6
	2005	8.3	6.8	8.9	167.1	75.9	116.4	8.0	4.4	5.2
	2006	14.5	11.9	15.4	291.1	132.3	202.9	13.9	7.6	9.0
	2007	25.1	20.5	26.6	502.4	228.3	350.1	24.1	13.1	15.5
	2008	44.2	36.2	47.0	886.2	402.8	617.7	42.4	23.2	27.4
	2009	77.8	63.7	82.6	1558.0	708.2	1085.9	74.6	40.7	48.1
	2010	136.4	111.7	144.9	2733.7	1242.6	1905.3	130.9	71.5	84.4
	2011	239.1	195.8	253.9	4791.1	2177.8	3339.3	229.4	125.3	147.9
	2012	418.8	342.9	444.6	8391.6	3814.4	5848.7	401.8	219.4	259.1
	2013	733.3	600.3	778.5	14692.4	6678.4	10240.1	703.5	384.2	453.7

Exhibit E-10: USGBC LEED Sector 40 Savings Impact

USGBC LEED Sector 40 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Maintenance and repair construction of residential structures	2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2002	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
	2003	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0
	2004	0.0	0.0	0.0	0.1	0.3	0.3	0.0	0.0	0.0
	2005	0.1	0.1	0.0	0.2	0.7	0.6	0.0	0.0	0.0
	2006	0.1	0.1	0.1	0.4	1.2	1.1	0.1	0.1	0.0
	2007	0.2	0.2	0.1	0.7	2.0	1.9	0.1	0.1	0.1
	2008	0.3	0.3	0.3	1.3	3.6	3.3	0.2	0.2	0.1
	2009	0.6	0.5	0.4	2.2	6.2	5.8	0.3	0.3	0.3
	2010	1.0	0.9	0.8	3.9	11.0	10.1	0.5	0.6	0.5
	2011	1.8	1.6	1.4	6.8	19.2	17.7	0.9	1.0	0.8
	2012	3.2	2.8	2.4	11.9	33.7	31.0	1.5	1.8	1.4
	2013	5.5	4.9	4.2	20.8	58.9	54.3	2.6	3.1	2.4

Exhibit E-11: USGBC LEED Sector 390 Savings Impact

USGBC LEED Sector 390 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Waste management and remediation services	2000	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0
	2001	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0
	2002	0.0	0.0	0.0	0.5	0.5	0.5	0.0	0.0	0.0
	2003	0.1	0.1	0.1	1.4	1.4	1.4	0.1	0.1	0.1
	2004	0.3	0.2	0.2	2.9	2.9	3.0	0.2	0.2	0.1
	2005	0.5	0.5	0.5	5.6	5.6	5.9	0.3	0.3	0.3
	2006	0.9	0.8	0.8	9.8	9.8	10.3	0.6	0.5	0.5
	2007	1.6	1.4	1.4	16.8	16.8	17.9	1.0	0.9	0.8
	2008	2.8	2.5	2.4	29.7	29.7	31.5	1.8	1.6	1.4
	2009	4.9	4.4	4.2	52.3	52.3	55.4	3.1	2.9	2.5
	2010	8.7	7.7	7.4	91.7	91.7	97.2	5.4	5.0	4.3
	2011	15.2	13.4	13.0	160.7	160.7	170.3	9.5	8.8	7.6
	2012	26.6	23.5	22.8	281.4	281.4	298.3	16.6	15.4	13.3
	2013	46.5	41.1	39.9	492.7	492.7	522.3	29.1	26.9	23.3

Exhibit E-12: USGBC LEED Sector 33 Savings Impact

USGBC LEED Sector 33 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Water, sewage and other systems	2000	0.0	0.0	0.0	0.2	0.1	0.3	0.0	0.0	0.0
	2001	0.1	0.0	0.0	0.5	0.3	0.6	0.0	0.0	0.0
	2002	0.2	0.1	0.1	1.2	0.8	1.4	0.1	0.0	0.1
	2003	0.5	0.2	0.3	3.4	2.3	4.1	0.3	0.1	0.2
	2004	1.1	0.4	0.7	7.1	4.9	8.7	0.6	0.3	0.4
	2005	2.1	0.7	1.3	13.9	9.6	17.1	1.3	0.5	0.8
	2006	3.6	1.3	2.3	24.2	16.7	29.8	2.2	0.9	1.3
	2007	6.2	2.2	3.9	41.8	28.7	51.4	3.8	1.6	2.3
	2008	11.0	3.9	6.9	73.7	50.7	90.6	6.7	2.8	4.0
	2009	19.3	6.9	12.1	129.7	89.1	159.4	11.8	4.9	7.0
	2010	33.9	12.1	21.2	227.5	156.4	279.6	20.7	8.6	12.3
	2011	59.5	21.2	37.1	398.7	274.1	490.1	36.3	15.1	21.6
	2012	104.2	37.1	65.0	698.3	480.1	858.3	63.6	26.5	37.9
	2013	182.4	64.9	113.8	1222.6	840.5	1502.8	111.3	46.5	66.3

Exhibit E-13: USGBC LEED Sector 31 Savings Impact

USGBC LEED Sector 31 Savings Impact Metrics		GDP (in million $)			Employment (in jobs)			Labor Earnings (in million $)		
		Direct	Indirect	Induced	Direct	Indirect	Induced	Direct	Indirect	Induced
Annual Savings Impact on Electric power generation, transmission, and distribution	2000	0.3	0.1	0.1	0.5	0.7	1.2	0.1	0.0	0.1
	2001	0.7	0.2	0.2	1.2	1.8	2.9	0.2	0.1	0.1
	2002	1.6	0.4	0.5	2.7	4.1	6.8	0.5	0.3	0.3
	2003	4.6	1.3	1.5	7.9	11.8	19.7	1.3	0.8	0.9
	2004	9.8	2.7	3.2	16.6	24.9	41.5	2.8	1.6	1.9
	2005	19.2	5.3	6.3	32.5	48.8	81.4	5.5	3.2	3.6
	2006	33.4	9.3	10.9	56.7	85.1	141.8	9.6	5.5	6.4
	2007	57.6	16.0	18.8	97.9	146.8	244.7	16.6	9.5	11.0
	2008	101.7	28.2	33.2	172.7	259.0	431.6	29.2	16.8	19.4
	2009	178.8	49.7	58.4	303.5	455.3	758.9	51.4	29.6	34.0
	2010	313.7	87.1	102.5	532.6	798.9	1331.5	90.2	51.9	59.7
	2011	549.8	152.7	179.6	933.4	1400.1	2333.5	158.1	90.9	104.7
	2012	963.0	267.5	314.6	1634.9	2452.3	4087.2	276.8	159.2	183.3
	2013	1686.1	468.3	550.8	2862.4	4293.6	7156.0	484.7	278.8	321.0