

# Economic Contributions of the Green Industry in the United States in 2013

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**SUMMARY.** Economic contributions of the green industry in the United States were estimated for 2013 using information on industry output, value added, employment and domestic/international exports, retail sector lawn and garden product sales, and economic multipliers from *Impact Analysis for Planning (IMPLAN)* regional economic models for each state. Direct industry output for all sectors was estimated at \$136.44 billion (B), and total output contributions, including indirect and induced regional economic multiplier effects of export sales, were \$196.07 B. The total value-added contribution to gross domestic product (GDP) was \$120.71 B, including labor income contributions of \$82.47 B, other property income contributions of \$28.91 B and business taxes paid to local, state, and federal governments of \$9.30 B. The industry had direct employment of 1,599,662 full-time and part-time jobs, and total employment contributions of 2,035,636 jobs in the broader economy. The largest individual industry sectors in terms of employment and GDP contributions were landscaping and horticultural services (1,105,526 jobs, \$54.70 B); greenhouse, nursery, and floriculture production (240,809 jobs, \$20.36 B); and lawn and garden equipment and supplies stores (217,798 jobs, \$12.87 B). The top 10 states in terms of employment contributions were California (245,267 jobs), Florida (197,073), Texas (149,364), Ohio (77,664), Pennsylvania (77,569), Illinois (76,254), New York (73,676), North Carolina (72,014), Georgia (64,066), and Michigan (63,189). Green industry contributions represented 0.72% of U.S. GDP and 1.11% of total workforce employment, and it contributed over 1.0% of GDP in five states, and over 1.25% of employment in 10 states. Employment contributions averaged 0.6 jobs/mile<sup>2</sup> of land area and 6.4 jobs per 1000 persons in the U.S. population, while GDP contributions averaged \$34,176/mile<sup>2</sup> and \$382 per capita. Since 2007–08, green industry contributions in 2013 increased by 4.4% for employment and 2.7% for GDP in inflation-adjusted terms. Growth in the industry was highest for wholesale and retail trade, whereas production and manufacturing declined. Although the green industry has grown slowly in recent years, it remains an important contributor to national, state, and local economies.

The U.S. environmental horticulture industry, or green industry, is comprised of wholesale nursery, greenhouse, turfgrass sod producers, landscape design, construction and maintenance firms, and wholesale and retail distribution firms such as garden centers, home stores, mass merchandisers with lawn/garden departments, brokers and rewholesale

distribution centers, and allied trade suppliers of inputs to the industry.

The green industry has historically been a fast-growing segment of the U.S. economy. However, the industry has reached the mature stage of its life cycle and is now growing slowly or even declining in some segments (Hall, 2010). According to the data from the Quarterly Census of Employment and Wages (U.S. Department of Labor, 2015), employment in the principal sectors of the U.S. green industry reached a peak of 1.285 million jobs in 2007, then dropped sharply during the global

recession of 2008–10. As of 2013, industry employment had recovered somewhat but had not yet returned to prerecession levels. Over the 2001–13 period, total employment in the industry declined by –0.4%, although this varied widely among specific industry sectors, with strong positive growth for landscaping services (+24.6%), but decreased for florists (–49.3%), landscape architectural services (–28.2%), lawn and garden equipment manufacturing (–20.8%), and nursery and floriculture production (–9.0%) (Fig. 1). Employment for most sectors increased during 2001–07, then declined during the recession of 2007–09, and recovered during 2011–13, but remained below the peak level in 2007. The only industry sector showing steadily downward trending employment was florists, consistent with the decreasing number of brick-and-mortar establishments. The number of business establishments in the green industry also declined during the recession, and has not recovered, in part due to consolidation and increasing concentration in the industry (Hall, 2010). The housing sector collapse during the recession revealed that the rate of industry growth was unsustainable.

Recognizing the limitations of existing data sources and the critical need for economic impact information, numerous state nursery and landscape industry organizations have sponsored economic impact studies for their respective states. For example, studies were conducted in Florida (Hodges et al., 2011a), Louisiana (Hinson et al., 2003), and Colorado (Thilmany et al., 2003). Stakeholders have found these studies to be useful in communicating the importance of the green industry to policymakers to gain assistance and resources, and in combating proposed legislation that would negatively impact the industry. However, direct comparison of these results across states is complicated because of differences in research methods used in these studies. For example, some states used mail, telephone, or personal interview surveys to collect primary data, whereas

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## Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
2.5900	mile <sup>2</sup>	km <sup>2</sup>	0.3861

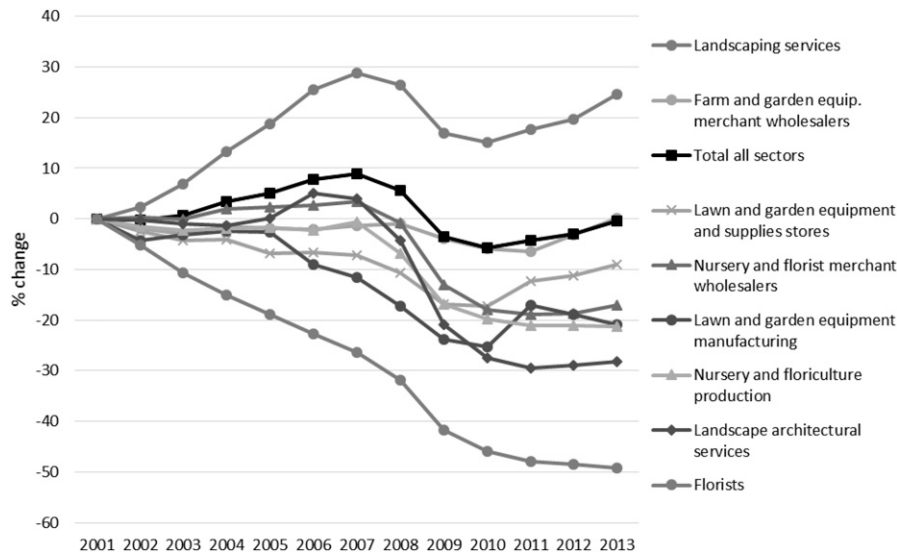


Fig. 1. Change in direct employment in primary sectors of the U.S. green industry from 2001 through 2013 (U.S. Department of Labor, 2015).

others relied on secondary data sources. Another important difference is the number and type of sectors that were included in each respective study, with some states including end users such as households, golf courses, and sports complexes, whereas others did not. Also, the regional economic models used to determine economic multipliers differed between studies. These factors point to the need to conduct a comprehensive national study that uses a common methodology to collect industry data and calculate associated economic contributions.

The first attempt to develop an internally consistent estimate of state and national economic contributions of the green industry was reported by Hall et al. (2006), with total national economic contributions of the industry in 2002 given as 1.96 million full-time and part-time jobs, \$147.8 B in industry output, and \$95.1 B in value added or GDP, expressed in 2004 dollars. In a follow-up study for 2007–08, the total national contributions of the industry were estimated at 1.95 million jobs, \$175.26 B in industry output, and \$107.16 B in GDP (Hodges et al., 2011b). The largest individual industry sectors in 2007–08 in terms of employment and GDP contributions were landscaping services (1,075,343 jobs, \$50.3 B), nursery, and greenhouse production (436,462 jobs, \$27.1 B), and building materials and garden equipment and supplies stores (190,839 jobs, \$9.7 B). The top 10 individual states

in terms of employment contributions were California (257,885 jobs), Florida (188,437), Texas (82,113), North Carolina (81,113), Ohio (79,707), Pennsylvania (75,604), New Jersey (67,993), Illinois (67,382), Georgia (66,042), and Virginia (58,677). The green industry represented 0.76% of U.S. GDP in 2008.

The objective of this paper is to update the previous estimates of the economic contributions of the green industry in 2013 at the national and state levels, by using a consistent set of nationwide data to enable reliable comparisons among U.S. states and regions. This information can be used to inform public policy and support efforts by industry stakeholders to communicate the importance of the industry.

**Materials and methods**

Economic sectors associated with the green industry were identified based on definitions in the North American Industry Classification System [NAICS (U.S. Department of Commerce, 2015c)]. The production and manufacturing industry group includes the sectors for nursery, greenhouse, and floriculture production (NAICS 11142) and lawn and garden equipment manufacturing (333112). The landscape design, construction, and maintenance services industry group includes the sectors landscaping services (56173) and landscape architectural services (54132).

The wholesale and retail distribution industry group includes farm and garden equipment merchant wholesalers (423820), nursery and florist merchant wholesalers (42493), lawn and garden equipment and supplies stores (4442), and florists (4531). These green industry sectors collectively had a total of 155,900 business establishments, with 1,173,894 direct employees, and \$37.55 B in wages paid in 2013 (Table 1). In addition, retail sectors that have significant sales of horticultural merchandise were included in the study.

State level economic data on industry output, value added, employment, labor income, other property income, business taxes, and domestic and international exports for green industry sectors were compiled from the IMPLAN database for 2013 (IMPLAN Group, LLC, 2015). These data were derived from a variety of sources, including the Quarterly Census of Employment and Wages, state and national GDP and personal income statistics, the Economic Census and Census of Agriculture, which are considered very reliable sources, with a well-established methodology, adjustment for nonresponding firms, and published statistical confidence parameters. Note that information on employment in the IMPLAN database may differ from that given by the Quarterly Census of Employment and Wages due to adjustments for nonemployer sole proprietor firms.

For some industry sectors in the IMPLAN data, the proportion of activity attributable to horticulture-related activity was determined based on the share of employment in the parent NAICS sector: landscape architectural services within architectural and engineering services, florists within miscellaneous store retailers, and nursery and florist merchant wholesalers and farm and garden equipment merchant wholesalers within wholesale trade. The farm and garden equipment wholesaler sector was further subdivided to estimate for garden equipment only (excluding farm equipment).

For all of the retail sectors, except florists, green industry economic contributions were estimated using data on lawn, garden, and farm equipment and supplies sales as a share of total U.S. retail sales reported in the 2012 economic census (U.S. Department of Commerce, 2015b), as shown in Table 2. The largest retail

**Table 1. Number of business establishments, number of employees, and wages paid in principal sectors of the U.S. green industry in 2013 (U.S. Department of Labor, 2015).**

Industry sector (NAICS code) <sup>2</sup>	Business establishments (no.)	Employees (no.)	Wages paid (\$ million)
Landscaping services (56173)	98,857	653,995	19,787
Lawn and garden equipment and supplies stores (4442)	16,836	141,697	5,468
Nursery and floriculture production (11142)	14,334	122,399	4,093
Farm and garden equipment merchant wholesalers (423820)	8,117	102,423	3,394
Florists (4531)	7,616	63,248	1,588
Nursery and florist merchant wholesalers (42493)	6,458	42,064	1,399
Landscape architectural services (54132)	3,444	30,773	1,159
Lawn and garden equipment manufacturing (333112)	238	17,295	664
Total	<u>155,900</u>	<u>1,173,894</u>	<u>37,551</u>

<sup>2</sup>North American Industry Classification System (U.S. Department of Commerce, 2015c).

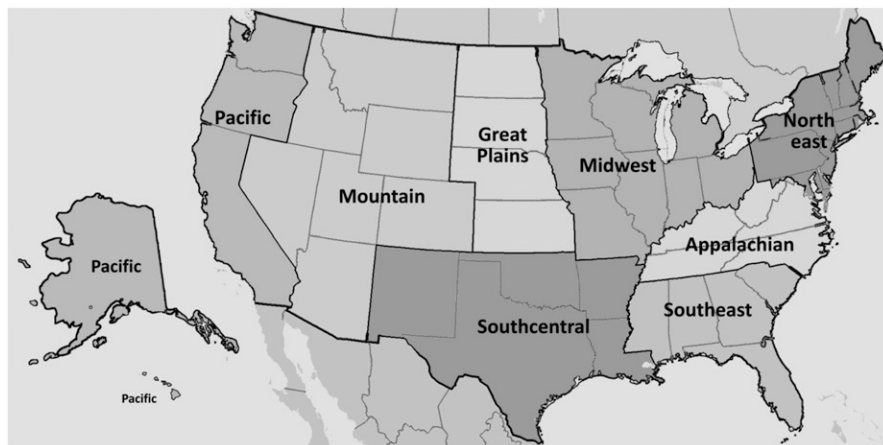
**Table 2. Retail sector product line sales of lawn, garden, farm equipment and supplies, and share of total sales in the U.S. in 2012 (U.S. Department of Commerce, 2015b).**

Industry (NAICS code) <sup>2</sup>	Business establishments selling product line (no.)	Product line sales (\$ million)	Total sales of all establishments (\$ million)	Product line sales as share of total sales (%)
Building material and garden equipment and supplies dealers (444)	34,770	50,078	279,475	17.92
Food and beverage stores (445)	31,113	10,817	621,698	1.74
General merchandise stores (452)	15,842	8,438	641,353	1.32
Nonstore retailers (454)	2,465	5,995	384,054	1.56
Miscellaneous store retailers (453)	16,614	4,056	97,647	4.15
Gasoline stations (447)	1,406	361	554,241	0.07
Total for sectors used in analysis <sup>3</sup>	<u>102,210</u>	<u>79,745</u>	<u>2,578,468</u>	<u>3.09</u>

<sup>2</sup>North American Industry Classification System (U.S. Department of Commerce, 2015c).

<sup>3</sup>Excludes retail sectors with relatively small values: health and personal care stores (446), motor vehicle and parts dealers (441), sporting goods stores (451), furniture stores (442), electronics and appliance stores (443), and clothing stores (448).

sectors for product line sales were building material and garden equipment and supplies dealers (\$50.08 B), food and beverage stores (\$10.82 B), general merchandise stores (\$8.44 B), nonstore retailers (\$6.00 B), miscellaneous store retailers (\$4.06 B), and gasoline stations (\$361 million). The product line sales represented 17.9% of total sector sales for building material and garden equipment and supplies dealers, 4.2% for miscellaneous store retailers, and less than 2% for the other sectors. Some retail sectors were not included in the analysis because the lawn and garden product sales were relatively minor and represented less than 1% of total sales: health and personal care stores, motor vehicle and parts dealers, sporting goods stores, furniture stores, electronics and appliance stores, and clothing stores. Specific lawn and garden product lines reported included outdoor nursery stock; indoor potted plants and floral items; cut flowers; fertilizer, lime, chemicals, and other soil treatments; lawn and garden



**Fig. 2. Map of U.S. agroclimatic regions for economic contribution analysis of the green industry.**

equipment and tools; materials used in landscaping or lawn service; and artificial/silk flowers plants trees. These specific items totaled \$50.55 B, or 81.8% of total itemized sales within the broad product line of lawn, garden, and farm equipment and supplies. The share of total sales in each retail sector and state were estimated using the

percentage of total national sales of the broad product line in 2012, adjusted for the share of sales of specific horticultural products net of farm-related equipment and supplies (81.8%), and further adjusted for the state-level share of product line sales from the 2007 economic census (U.S. Department of Commerce, 2009).

The regional economic contributions of green industry sectors in each state were evaluated using economic multipliers from the *IMPLAN* Input-Output/Social Accounting Matrix software, with models created for each state (*IMPLAN* Group, LLC, 2015). These models represent the structure of a regional economy in terms of transactions between industries, employees, households, and government institutions (Miller and Blair, 2009). The *IMPLAN* modeling system contains regional economic data for 536 industry sectors, including commodity production, employment, household income, commodity trade, capital investment, taxes, transfer payments (e.g., welfare,

retirement pensions), and gross margins for wholesale and retail trade sectors, which represent the share of sales that constitute final demand after subtracting the cost of goods sold. Final demand economic multipliers from *IMPLAN* were used to estimate the total economic activity generated from in-state sales and export sales. The multipliers captured the effects of product or service sales (direct effects), supply chain purchases by industry firms from other economic sectors (indirect effects) and employee household consumer spending, and local, state, and federal government spending (induced effects). Separate multipliers were used for industry output (sales revenues or

receipts), employment, value added, and labor income (earnings). The multipliers for output, value added, labor income, other property income and business taxes are expressed in units of dollars per dollar output, whereas the multipliers for employment are expressed in jobs per million dollars final demand. Differences in multiplier values reflect the structure of industry sectors, the degree of economic integration, and the mix of supplier industries available to meet local demands in each state. The economic multipliers were applied to industry sales to estimate total economic contributions using the formula:  $I_{hij} = S_{hi} \times [A_{hij} + E_{hi} \times (B_{hij} + C_{hij})]$ , where  $I_{hij}$  is total impact

**Table 3. Economic contributions of U.S. green industry groups and sectors in 2013 (IMPLAN Group, LLC, 2015).**

Industry group/sector	Direct employment Full-time and part-time jobs (no.)	Employment contribution <sup>z</sup> Full-time and part-time jobs (no.)	Direct industry output	Domestic and international exports	Economic contribution <sup>z</sup>				
					Industry output	Gross Domestic Product	Labor income	Other property income	Business taxes
Production and manufacturing	152,614	291,853	25,900	14,624	45,615	24,834	16,203	7,694	939
Greenhouse, nursery, and floriculture production	134,471	240,809	16,766	9,104	31,252	20,358	13,709	5,938	713
Lawn and garden equipment manufacturing	18,143	51,043	9,135	5,520	14,363	4,476	2,494	1,756	225
Landscape design, construction, and maintenance services	959,208	1,164,237	63,903	18,413	91,691	58,963	43,192	13,487	2,266
Landscape and horticultural services	914,847	1,105,526	58,284	17,356	84,169	54,697	38,903	13,637	2,141
Landscape architectural services	44,361	58,710	5,619	1,057	7,522	4,266	4,290	-150	125
Wholesale and retail distribution	487,840	579,546	46,634	7,226	58,760	36,910	23,079	7,726	6,090
Lawn and garden equipment and supplies stores	194,987	217,798	18,127	1,801	21,009	12,869	8,478	2,238	2,141
Florists	127,336	132,163	4,916	392	5,564	3,535	3,055	-91	570
Nursery and florist merchant wholesalers	46,693	84,242	10,872	2,908	15,951	10,328	5,767	2,908	1,653
Food and beverage stores, lawn and garden sales	39,859	42,938	2,674	252	3,114	2,022	1,381	348	292
Farm and garden equipment merchant wholesalers	23,344	39,396	5,244	1,272	7,336	4,669	2,602	1,339	726
General merchandise stores, lawn, and garden sales	32,287	35,436	2,265	232	2,668	1,647	1,033	206	407
Nonstore retailers, lawn, and garden sales	22,749	26,860	2,495	358	3,062	1,807	738	773	297
Gasoline stores, lawn, and garden sales	585	713	41	11	57	35	25	5	5
<b>Total all sectors</b>	<b>1,599,662</b>	<b>2,035,636</b>	<b>136,438</b>	<b>40,263</b>	<b>196,066</b>	<b>120,707</b>	<b>82,474</b>	<b>28,906</b>	<b>9,295</b>

<sup>z</sup>Economic contribution estimates include indirect and induced regional multiplier effects.

for measures (j) of output, employment, value added, labor income, other property income or business taxes, in sector (i), and state (h),  $S_{hi}$  is industry sales or output,  $A_{hij}$  is the direct effects multiplier,  $E_{hi}$  is the proportion of industry sales exported to domestic or international markets,  $B_{hij}$  is the indirect effects multiplier, and  $C_{hij}$  is the induced effects multiplier. The calculation treats only the export portion of output as new final demand, which is subject to the full multipliers effects (direct, indirect, and induced), while in-state sales reflect intermediate demand from other business sectors and are subject only to the direct effects multipliers. The economic analysis results were compiled and reported for each industry sector and individual states within eight agroclimatic regions of the United States, as shown in Fig. 2, that are similar to farm production regions defined by the U.S. Department of Agriculture (2000). The results are described interchangeably as economic contributions or impacts, although it is understood that these values represent the ongoing activity in the industry rather than a net change in economic activity (Watson et al., 2007).

## Results and discussion

The estimated total economic contributions of the U.S. green industry in 2013 were summarized by industry groups and sectors (Table 3; Figs. 3 and 4). Direct industry output or sales revenues for all sectors was \$136.44 B. Domestic and international exports (out-of-state sales) of goods and services were \$40.26 B. The total output contribution, including indirect and induced regional economic multiplier effects of exports, was \$196.07 B. Direct employment by green industry firms was 1,599,662 full-time and part-time jobs, and the total employment contribution (including multiplier effects) in the broader economy was 2,035,636 jobs. The total value-added or GDP contribution was \$120.71 B. The labor income contribution, representing employee compensation, benefits, and business owner income, was \$82.47 B, the property income contribution, representing rents, royalties, corporate dividends, capital gains, and interest, was \$28.91 B, and the contribution of \$9.30 B in business taxes on sales, property, payroll,

excise, motor vehicle, fuels, etc. that were paid to local, state, and federal governments.

The production and manufacturing industry group, including the sectors nursery and greenhouse production and lawn and garden equipment manufacturing, had contributions of \$45.62 B in output, \$24.83 B to GDP, \$16.20 B in labor income, \$7.69 B in other property income, and 291,853 jobs (Table 3). This industry group represented 23.3% of total output contributions, 20.6% of GDP contributions, and 14.3% of employment contributions. The landscape

design, construction, and maintenance services industry group, consisting of landscape and horticultural services and landscape architectural services firms, had contributions of \$91.69 B in output, \$58.96 B in GDP, \$43.19 B in labor income, \$13.49 B in other property income, and 1,164,237 jobs, which represented 46.8%, 48.8%, and 57.2% of total green industry output, GDP, and employment contributions, respectively. The wholesale and retail distribution industry group had contributions of \$58.76 B in output, \$36.91 B in GDP, \$23.08 B in labor income, \$7.73 B in other property income, and

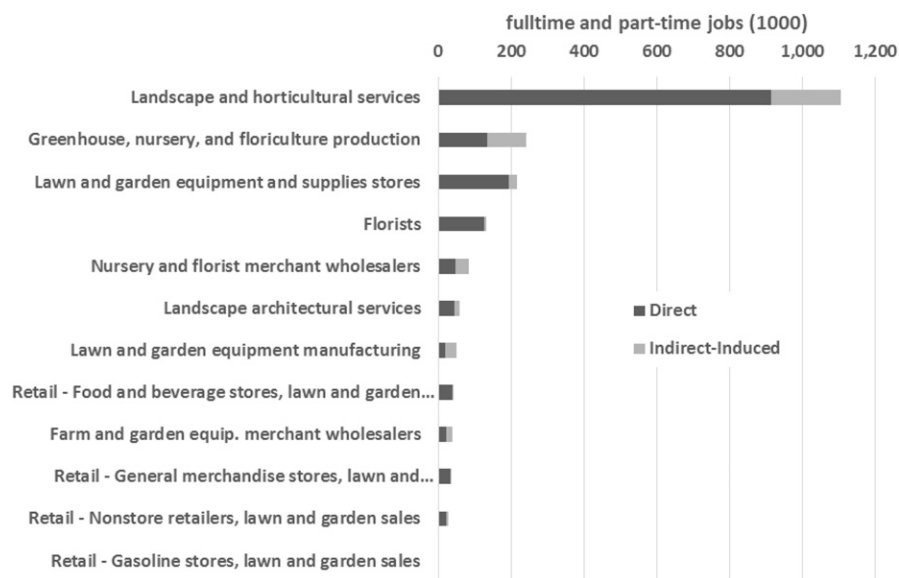


Fig. 3. Employment contributions of U.S. green industry sectors by direct- and indirect-induced multiplier effects in 2013.

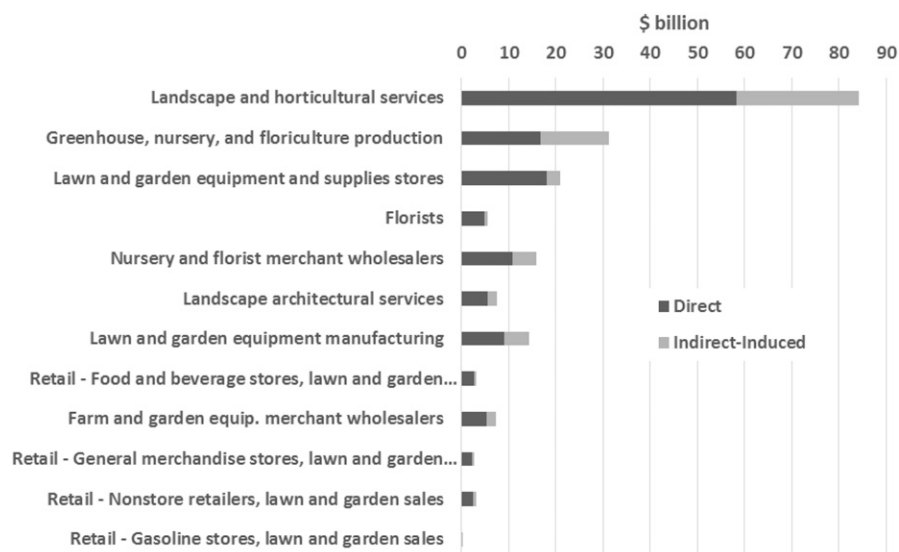


Fig. 4. Output contributions of U.S. green industry sectors by direct- and indirect-induced multiplier effects in 2013.

579,546 jobs, representing 30.0%, 30.6%, and 28.5% of total green industry output, GDP, and employment contributions, respectively. This latter group also had the largest business tax contributions of \$6.09 B, mainly due to sales taxes on goods sold. Indirect and induced multiplier effects represented 30.4% of total output contributions for the overall green industry, while the share for production and manufacturing was higher (43.2%) than for landscape services (30.3%) and wholesale and retail distribution (20.6%), because the producer sectors had a larger share of out-of-state sales, representing 56.5% of direct output.

By far the largest individual green industry sector was landscape and horticultural services, with contributions of \$84.17 B in output, \$54.70 B in GDP, and 1,105,526 jobs (Figs. 3–5). The next largest industry sector was greenhouse, nursery, and floriculture production, with \$31.25 B in output, \$20.36 B in GDP, and 134,471 jobs. The largest retail sector was lawn and garden equipment and supplies stores, with contributions of \$21.01 B in output, \$12.87 B in GDP, and 217,798 jobs. Retail florists had contributions of \$5.56 B in output, \$3.54 B in GDP, and 132,163 jobs. Nursery and florist merchant wholesalers had contributions of \$15.95 B in output, \$10.33 B in GDP, and 84,242 jobs, while garden equipment merchant wholesalers had \$7.34 B, \$4.67 B, and 39,396 jobs, respectively. There were also

significant contributions for lawn and garden product sales in the retail sectors by food and beverage stores (\$3.11 B output, \$2.02 B GDP, 42,938 jobs), nonstore retailers (\$3.06 B output, \$1.81 B GDP, 26,860 jobs), and general merchandise stores (\$2.69 B output, \$1.65 B GDP, 35,436 jobs). Lawn and garden equipment manufacturing contributed \$14.36 B in output, \$4.48 B in GDP, and 51,043 jobs. Landscape architectural services contributed \$7.52 B in output, \$4.27 B in GDP, and 58,710 jobs. Gasoline stores were the smallest sector evaluated, with contributions of \$57 million in output, \$35 million in GDP, and 713 jobs.

Economic contributions of the green industry in U.S. states and regions are summarized in Table 4 and Fig. 5. The largest regions in terms of employment contributions were the Midwest (387,748 jobs) and Northeast (381,307), followed by the Southeast (342,224), Pacific (333,419), Southcentral (214,372), Appalachian (199,553), Mountain (130,579), and Great Plains (46,435). Industry output contributions were over \$35 B and GDP contributions exceeded \$22 B in the Midwest, Northeast, and Pacific regions. The Southeast region had \$32.62 B in output and \$18.91 B in GDP. The Southcentral and Appalachian regions had over \$18 B in output and \$10 B in GDP. The Mountain region had \$11.54 B in output and \$7.16 B in GDP. The

Great Plains regions had the lowest green industry contributions of \$4.79 B in output and \$2.79 B in GDP.

In terms of the relative importance of green industry sectors across regions, measured as the share of green industry employment, greenhouse, nursery, and floriculture production was most prominent in the Pacific (20.4%), Southeast (12.8%), Southcentral (11.7%), and Northeast (11.1%); landscape and horticultural services was highest in the Mountain (63.1%), Northeast (58.4%), Southeast (57.6%), and Appalachian (56.7%); lawn and garden equipment manufacturing was highest in the Midwest (5.5%), Great Plains (4.8%), and Southeast (4.6%); retail lawn and garden stores were highest in the Great Plains (23.8%), Midwest (14.2%), Southcentral (13.7%), and Appalachian (12.1%); florists were highest in the Great Plains (8.7%), Midwest (7.9%), Northeast (7.8%), and Southcentral (7.5%); nonstore retailers were highest in the Midwest (2.3%), Northeast (1.8%), and Great Plains (1.6%).

Among individual states, the top 10 states in terms of total employment and GDP contributions were California (245,267 jobs, \$17.27 B), Florida (197,073 jobs, \$10.82 B), Texas (149,364 jobs, \$8.56 B), Ohio (77,664 jobs, \$4.43 B), Pennsylvania (77,569 jobs, \$4.46 B), Illinois (76,254 jobs, \$5.00 B), New York (73,676 jobs, \$4.60 B), North Carolina (72,014 jobs, \$4.14 B), Georgia (64,066 jobs, \$3.79 B), and Michigan (63,189 jobs, \$3.68 B), as shown in Table 4. Other states with employment contributions exceeding 40,000 jobs and value-added contributions over \$2.6 B were New Jersey, Virginia, Maryland, Massachusetts, Tennessee, Wisconsin, and Washington. The top three states for total industry output contributions were California (\$26.60 B), Florida (\$17.59 B), and Texas (\$13.46 B), followed by Illinois (\$8.19 B), Ohio (\$7.66 B), Pennsylvania (\$6.99 B), New York (\$6.94 B), North Carolina (\$6.88 B), and Georgia (\$6.72 B). The largest employment contributions in the landscape services sector were in California (133,248 jobs), Florida (124,430 jobs), and Texas (79,018 jobs), which represented over half (59.2%, 65.8%, and 56.8%, respectively) of total green

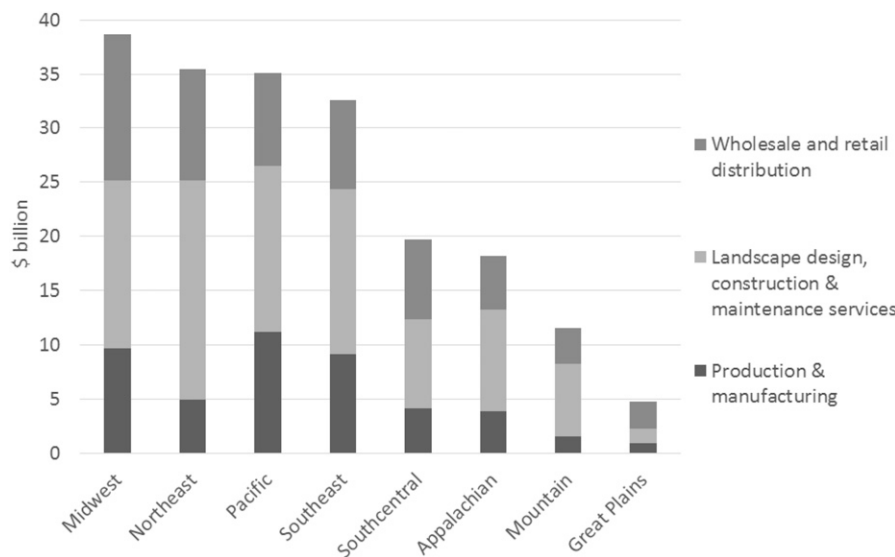


Fig. 5. Output contributions of green industry groups in U.S. agroclimatic regions in 2013.

**Table 4. Economic contributions of the green industry in U.S. regions and states in 2013.**

Region/state	Direct industry output	Industry output contribution <sup>z</sup>	Gross Domestic Product contribution <sup>z</sup>	Employment contribution by industry group <sup>z</sup>				Total
				Direct employment	Production and manufacturing	Landscape services	Wholesale and retail distribution	
							Full-time and part-time jobs (no.)	
Appalachian	12,693	18,195	10,939	157,189	26,490	118,985	54,078	199,553
Kentucky	1,522	1,983	1,120	18,821	1,928	11,208	9,288	22,424
North Carolina	4,555	6,875	4,142	53,506	9,707	46,023	16,284	72,014
Tennessee	2,947	4,366	2,454	34,002	10,594	21,883	12,004	44,481
Virginia	3,218	4,371	2,847	43,819	3,680	35,672	13,016	52,368
West Virginia	451	600	376	7,042	582	4,198	3,485	8,265
Great Plains	3,432	4,785	2,791	35,885	3,960	19,026	23,449	46,435
Kansas	1,533	2,241	1,234	14,967	2,841	10,581	6,840	20,262
Nebraska	1,022	1,272	769	11,636	777	4,652	8,233	13,662
North Dakota	455	694	436	4,721	119	1,866	4,614	6,598
South Dakota	421	578	351	4,561	223	1,927	3,763	5,913
Midwest	27,624	38,697	22,780	306,320	51,560	196,609	139,579	387,748
Illinois	5,922	8,191	5,003	61,072	9,146	42,253	24,855	76,254
Indiana	2,542	3,524	2,113	31,798	2,082	21,144	16,035	39,260
Iowa	1,494	1,870	1,091	16,840	1,775	7,339	10,666	19,780
Michigan	3,962	5,771	3,680	48,773	9,013	33,679	20,497	63,189
Minnesota	2,714	3,630	2,066	26,857	6,763	13,284	13,390	33,437
Missouri	2,467	2,966	1,774	30,704	1,975	17,771	14,966	34,712
Ohio	5,140	7,659	4,430	58,978	9,243	43,484	24,936	77,664
Wisconsin	3,383	5,086	2,623	31,300	11,562	17,656	14,233	43,452
Mountain	7,918	11,539	7,160	102,517	9,257	87,065	34,257	130,579
Arizona	2,458	3,495	2,165	29,347	2,920	24,948	9,520	37,389
Colorado	2,407	3,678	2,322	30,434	3,569	27,726	8,619	39,915
Idaho	650	895	544	8,099	627	6,036	3,666	10,329
Montana	385	589	341	5,476	374	3,404	3,440	7,218
Nevada	864	1,273	805	13,013	200	12,996	2,889	16,084
Utah	940	1,317	806	12,777	1,494	9,521	4,665	15,680
Wyoming	215	292	177	3,370	74	2,432	1,458	3,963
Northeast	25,871	35,445	23,405	313,965	43,124	233,745	104,438	381,307
Connecticut	2,087	3,051	2,052	25,173	4,151	20,251	7,344	31,747
Delaware	381	570	369	4,968	220	4,418	1,729	6,368
District of Columbia	78	87	60	961	0	410	600	1,009
Maine	584	938	578	8,253	818	7,660	2,778	11,256
Maryland	2,917	4,350	2,907	36,701	4,559	32,431	9,716	46,706
Massachusetts	2,961	4,166	2,819	36,406	2,568	31,890	10,028	44,487
New Hampshire	654	1,032	660	9,174	1,033	7,722	3,392	12,147
New Jersey	4,262	6,115	4,113	49,944	7,605	38,991	15,886	62,483
New York	6,156	6,944	4,620	68,567	5,202	39,931	28,542	73,676
Pennsylvania	5,026	6,991	4,455	63,323	16,101	40,993	20,475	77,569
Rhode Island	397	671	447	5,521	565	5,284	1,658	7,507
Vermont	367	530	325	4,975	301	3,763	2,289	6,353
Pacific	23,160	35,093	22,696	252,573	68,172	190,114	75,133	333,419
Alaska	150	169	111	2,199	198	1,259	874	2,330
California	17,358	26,599	17,269	184,507	48,446	145,249	51,572	245,267
Hawaii	583	782	511	8,766	1,791	6,022	2,509	10,321
Oregon	2,324	3,475	2,173	24,632	12,992	13,294	7,693	33,980
Washington	2,745	4,068	2,632	32,469	4,745	24,290	12,486	41,520
Southcentral	14,974	19,694	12,027	180,280	29,823	113,521	71,028	214,372
Arkansas	1,607	2,279	1,016	13,337	4,940	6,632	6,514	18,086
Louisiana	1,449	1,731	1,072	18,340	1,604	9,765	9,244	20,613
New Mexico	491	570	348	6,385	600	3,572	2,829	7,000
Oklahoma	1,332	1,653	1,028	16,767	2,547	8,649	8,113	19,309
Texas	10,095	13,461	8,563	125,451	20,132	84,904	44,328	149,364

(Continued on next page)

**Table 4. (Continued) Economic contributions of the green industry in U.S. regions and states in 2013.**

Region/state	Direct industry output	Industry output contribution <sup>z</sup>	Gross Domestic Product contribution <sup>z</sup>	Employment contribution by industry group <sup>z</sup>				
				Direct employment	Production and manufacturing	Landscape services	Wholesale and retail distribution	Total
\$ million								
Southeast	20,767	32,617	18,910	250,932	59,466	205,172	77,586	342,224
Alabama	1,582	2,184	1,339	22,544	4,724	13,204	9,425	27,353
Florida	10,666	17,587	10,819	142,409	29,244	129,643	38,186	197,073
Georgia	4,512	6,723	3,791	47,555	12,022	36,323	15,720	64,066
Mississippi	1,168	1,625	835	12,390	2,329	7,009	6,483	15,821
South Carolina	2,839	4,498	2,126	26,034	11,146	18,994	7,772	37,911
United States	<u>136,438</u>	<u>196,066</u>	<u>120,707</u>	<u>1,599,662</u>	<u>291,853</u>	<u>1,164,237</u>	<u>579,546</u>	<u>2,035,636</u>

<sup>z</sup>Contribution estimates include indirect and induced regional multiplier effects.

industry contributions in those states. These same three states had the largest employment contributions for greenhouse, nursery, and floriculture production: 48,302 jobs in California, 29,090 jobs in Florida, 19,799 jobs in Texas. Employment contributions in the lawn and garden equipment manufacturing sector were highest in Wisconsin (8506 jobs), South Carolina (7112 jobs), and Georgia (6752 jobs).

As a measure of the relative economic importance of the green industry, the value-added or GDP contribution represented 0.72% of U.S. GDP, the labor income contribution was 0.81% of total wages, benefits, and proprietor income, and the employment contribution represented 1.11% of the U.S. workforce in 2013 (Table 5). The top five states with the highest percentage contribution to GDP by the green industry were Florida (1.36%), South Carolina (1.13%), Vermont (1.09%), Oregon (1.05%), and Maine (1.04%). The top states in terms of percentage contribution to total employment were Florida (1.87%), South Carolina (1.51%), Vermont (1.49%), Oregon (1.49%), and New Hampshire (1.43%), and an addition five states that were above 1.25%, including Connecticut, Maine, Maryland, North Carolina, and Rhode Island.

The economic contributions of the green industry varied widely across regions and states, reflecting the heterogeneous economic conditions, urban development patterns, and levels of industry concentration. For the United States in 2013, employment contributions averaged 0.6 jobs/mile<sup>2</sup> of land area and 6.4 jobs per 1000 population, while GDP contributions averaged \$34,176/mile<sup>2</sup> and \$382/person

(Table 5). States with the highest economic contributions per square mile were in relatively small and densely populated areas: District of Columbia (16.6 jobs, \$991,300 GDP), New Jersey (8.5 jobs, \$559,300 GDP), Rhode Island (7.3 jobs, \$431,900 GDP), Connecticut (6.6 jobs, \$423,800 GDP), Massachusetts (5.7 jobs, \$361,400 GDP), and Maryland (4.8 jobs, \$299,500 GDP). Large, sparsely populated states such as Alaska, North Dakota, South Dakota, Montana, Wyoming, and New Mexico had economic contributions of less than 0.1 job and \$7 GDP/mile<sup>2</sup>. States with the highest employment contributions per 1000 persons population were Vermont (10.1 jobs), Florida (10.1), New Hampshire (9.2), North Dakota (9.1), Connecticut (8.8), Oregon (8.6), and Maine (8.5). States with the highest GDP contribution per person were North Dakota (\$603), Connecticut (\$571), Florida (\$553), Oregon (\$553), and Vermont (\$519). States with the lowest employment and GDP contributions per capita, all having less than 10 jobs per 1000 persons and less than \$300 GDP per person, included the District of Columbia, Louisiana, West Virginia, and New York, as well as large western states such as Alaska, Oklahoma, New Mexico, North Dakota, South Dakota, Idaho, and Utah.

During the 1980s and 1990s, the green industry was one of the fastest-growing sectors of the U.S. economy, due to robust demand for ornamental plants and related products and services from commercial and residential development and rising affluence. However, current trends

and driving forces indicate that consumer demand is maturing, and industry growth is slowing. Obviously, the severe economic recession of 2007–09 placed considerable financial strain on these businesses, as well as most other sectors of the global economy due to reduced home values and home ownership rates, and declining disposable household income in inflation-adjusted terms. Since the previous study for 2007–08 (Hodges et al., 2011b), the total economic contributions of the overall U.S. green industry in 2013 increased by 4.4% for employment, 2.0% for output, and 2.7% for GDP, with values adjusted for inflation using the GDP Implicit Price Deflator (U.S. Department of Commerce, 2015a). The wholesale and retail distribution industry group had significantly increased employment contributions (+62.1%), while landscape services increased only slightly (+3.6%), and production and manufacturing decreased (-37.3%). Note that somewhat different methods were used in the past studies, so the results are not strictly comparable. For example, the previous study used higher values for nursery and greenhouse production estimated from a national survey (Hodges et al., 2009) rather than official government economic data, so the decline observed for 2013 partly reflects this artifact of the research methodology. Compared with the previous study for 2002 (Hall et al., 2006), the total economic contributions of the industry in 2013 increased by 3.9% for employment, 10.9% for output, and 6.2% for GDP (inflation-adjusted). Over the 11-year period of 2002–13, the annual GDP growth rate averaged 0.56% (not compounded).



Table 5. Green industry employment and gross domestic product (GDP) contributions as a share of the total economy, per unit land area, and population in U.S. regions and states in 2013 (U.S. Department of Commerce, 2015d, 2015e).

Region/state	Share of employment (%)	Share of GDP (%)	Employment per unit land area (jobs/mile <sup>2</sup> ) <sup>z</sup>	Employment per capita population (jobs/1000 persons)	GDP per unit land area (\$1000/mile <sup>2</sup> ) <sup>z</sup>	GDP per capita population (\$/person)
Appalachian	1.15	0.74	1.0	6.5	56.7	355
Kentucky	0.92	0.60	0.6	5.1	28.4	255
North Carolina	1.32	0.89	1.5	7.3	85.2	421
Tennessee	1.19	0.84	1.1	6.8	59.5	378
Virginia	1.07	0.63	1.3	6.3	72.1	345
West Virginia	0.90	0.52	0.3	4.5	15.6	203
Great Plains	1.08	0.80	0.2	7.3	9.2	441
Kansas	1.08	0.84	0.2	7.0	15.1	426
Nebraska	1.09	0.72	0.2	7.3	10.0	412
North Dakota	1.14	0.83	0.1	9.1	6.3	603
South Dakota	1.02	0.78	0.1	7.0	4.6	416
Midwest	1.07	0.74	0.9	6.3	50.9	372
Illinois	1.01	0.70	1.4	5.9	90.1	388
Indiana	1.06	0.67	1.1	6.0	59.0	322
Iowa	0.97	0.66	0.4	6.4	19.5	353
Michigan	1.18	0.84	1.1	6.4	65.1	372
Minnesota	0.93	0.67	0.4	6.2	25.9	381
Missouri	0.97	0.63	0.5	5.7	25.8	294
Ohio	1.16	0.78	1.9	6.7	108.4	383
Wisconsin	1.22	0.93	0.8	7.6	48.4	457
Mountain	1.09	0.72	0.2	6.3	9.7	344
Arizona	1.09	0.76	0.3	5.6	19.1	327
Colorado	1.19	0.80	0.4	7.6	22.4	441
Idaho	1.13	0.87	0.1	6.4	6.6	337
Montana	1.13	0.79	0.0	7.1	2.3	336
Nevada	1.03	0.61	0.1	5.8	7.3	289
Utah	0.90	0.58	0.2	5.4	9.8	278
Wyoming	1.01	0.41	0.0	6.8	1.8	303
Northeast	1.00	0.60	2.2	6.0	134.8	369
Connecticut	1.40	0.84	6.6	8.8	423.8	571
Delaware	1.17	0.60	3.3	6.9	189.5	399
District of Columbia	0.13	0.05	16.5	1.6	991.3	94
Maine	1.39	1.04	0.4	8.5	18.7	435
Maryland	1.35	0.86	4.8	7.9	299.5	490
Massachusetts	1.02	0.63	5.7	6.6	361.4	421
New Hampshire	1.43	0.96	1.4	9.2	73.7	499
New Jersey	1.22	0.77	8.5	7.0	559.3	462
New York	0.63	0.35	1.6	3.7	98.0	235
Pennsylvania	1.05	0.69	1.7	6.1	99.6	349
Rhode Island	1.25	0.83	7.3	7.1	431.9	425
Vermont	1.49	1.09	0.7	10.1	35.3	519
Pacific	1.15	0.77	0.4	6.5	25.4	442
Alaska	0.48	0.17	0.0	3.2	0.2	151
California	1.15	0.79	1.6	6.4	110.9	451
Hawaii	1.10	0.62	1.6	7.4	79.6	364
Oregon	1.49	1.05	0.4	8.6	22.6	553
Washington	1.04	0.65	0.6	6.0	39.6	378
Southcentral	0.93	0.55	0.4	5.4	22.0	301
Arkansas	1.15	0.82	0.3	6.1	19.5	343
Louisiana	0.79	0.42	0.5	4.5	24.8	232
New Mexico	0.65	0.38	0.1	3.4	2.9	167
Oklahoma	0.86	0.56	0.3	5.0	15.0	267
Texas	0.97	0.56	0.6	5.6	32.8	324
Southeast	1.51	1.08	1.4	8.1	79.2	449
Alabama	1.08	0.67	0.5	5.7	26.4	277

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Table 5. (Continued) Green industry employment and gross domestic product (GDP) contributions as a share of the total economy, per unit land area, and population in U.S. regions and states in 2013 (U.S. Department of Commerce, 2015d, 2015e).

Region/state	Share of employment (%)	Share of GDP (%)	Employment per unit land area (jobs/mile <sup>2</sup> ) <sup>x</sup>	Employment per capita population (jobs/1000 persons)	GDP per unit land area (\$1000/mile <sup>2</sup> ) <sup>z</sup>	GDP per capita population (\$/person)
Florida	1.87	1.36	3.7	10.1	201.8	553
Georgia	1.16	0.83	1.1	6.4	65.9	379
Mississippi	1.04	0.78	0.3	5.3	17.8	279
South Carolina	1.51	1.13	1.3	7.9	70.7	445
United States	1.11	0.72	0.6	6.4	34.2	382

<sup>x</sup>1 job/mile<sup>2</sup> = 0.3861 job/km<sup>2</sup>, \$1000/mile<sup>2</sup> = \$386.1022/km<sup>2</sup>.

In spite of slow growth or decreased activity in some sectors recent years, the green industry remains an important contributor to the U.S. economy, and to individual states and regions. The green industry is extremely broad based, with the landscape services and wholesale-retail trade sectors existing in virtually all communities in the nation, whereas the production and manufacturing sectors are concentrated in some states, and contribute disproportionately because of out-of-state shipments that bring new money into the local economies.

These findings are critical to our understanding of the structure-conduct-performance issues affecting the green industry, as well as the economy at large. The results will help to enable participants in the green industry in making strategic decisions regarding future investments in their respective businesses. In addition, government policymakers and regulators will have better information to improve decisions regarding efficient allocation of resources (e.g., water and labor) among competing industries and interests.

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