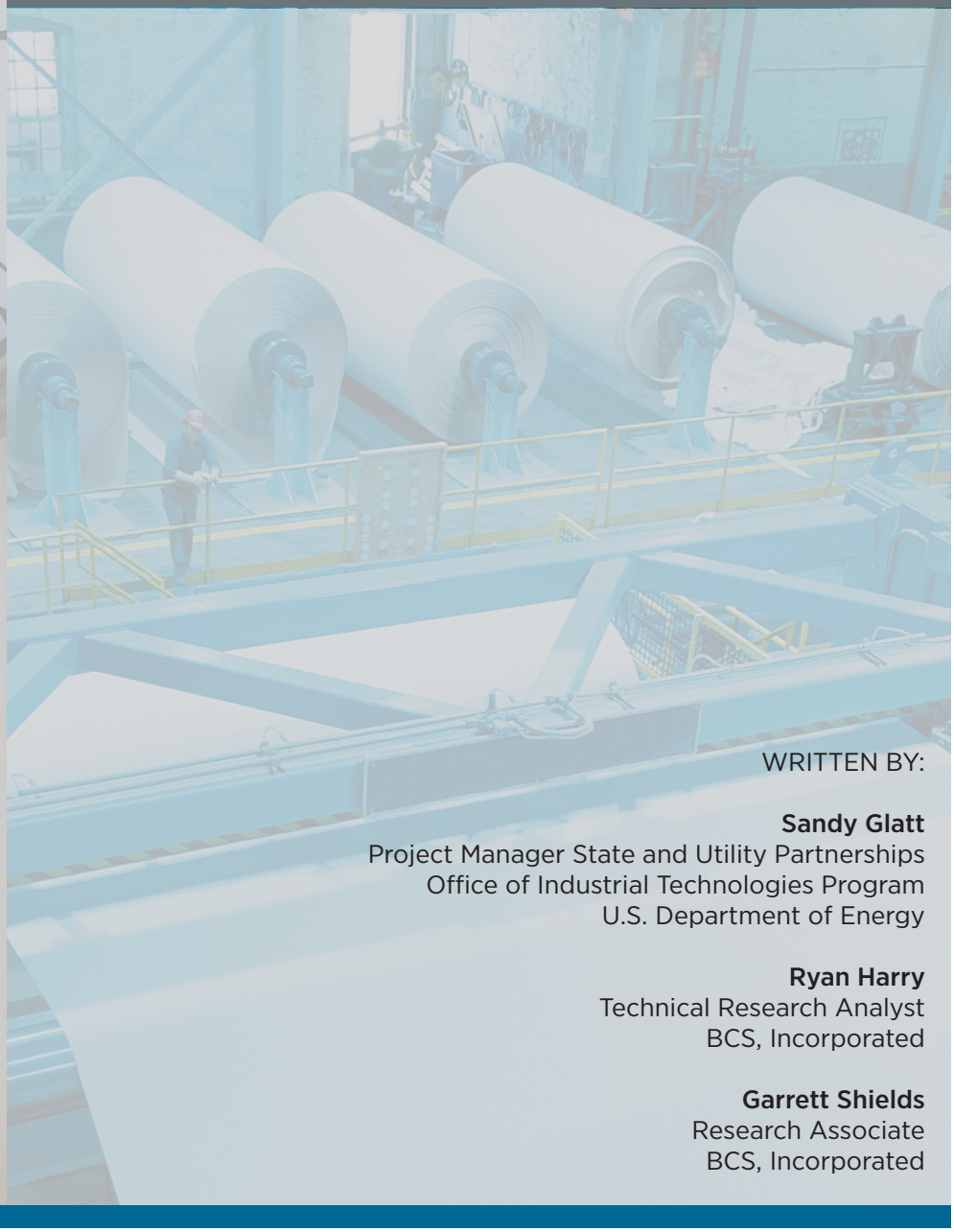
U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

INDUSTRIAL TECHNOLOGIES PROGRAM

Energy Efficiency as a Resource: Northeast Region

December 2009



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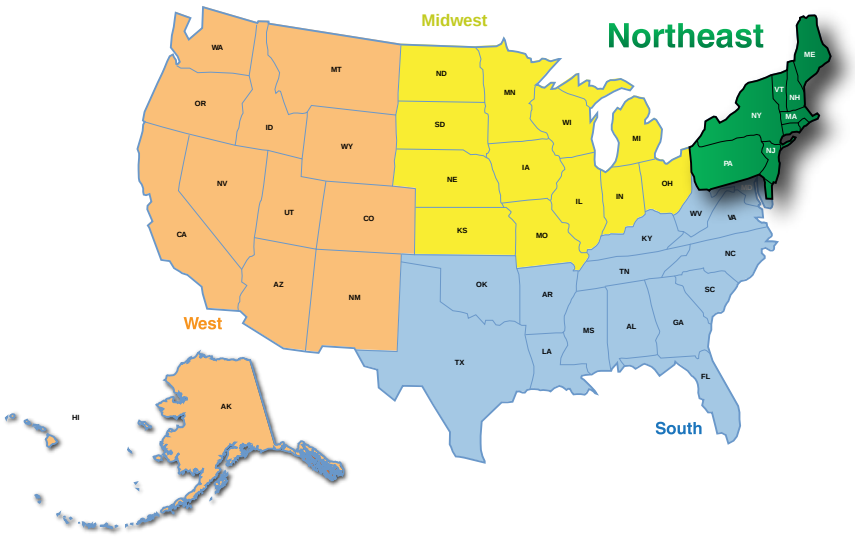


Source: Stats Indiana, Boundary Maps. www.stats.indiana.edu/maptools/boundary.asp.

1. Northeast Region Energy Intensity

The Northeastern United States is one of four regions defined by the U.S. Census Bureau (Exhibit 1), composed of the following states:

- Connecticut
- Main
- Massachusetts
- New Hampshire
- New Jersey
- New York
- Pennsylvania
- Rhode Island
- Vermont

The Northeast does not lead the nation in terms of value of shipments in any manufacturing sector according to the 2006 Annual Survey of Manufactures. This is primarily due to the Northeast having the highest regional energy prices in the nation. Industrial manufacturers typically prefer to operate in areas with lower energy prices, helping to reduce their overall operating costs. The lack of a large industrial presence in the Northeast implies the region will have fewer shipments, lowering the overall value of shipments. This helps explain why the Northeast does not lead the nation in terms of shipment values in any sectors. Exhibit 2 provides value of shipment data for the four census regions that make up the U.S. manufacturing sector.

Unlike the Midwest and the South, where many of the leading industries experience relatively high energy intensities*, many industries in the Northeast have an energy intensity that is lower than the national average. This is partly due to higher energy prices. Despite having lower-than-average energy intensity in many of its industrial sectors, the Northeast still experiences higher-than-average energy intensity in certain important sectors. This occurs even without the large concentrations of energy-intensive industries driving up the regional energy intensity average, implying the Northeast has notable room for improvement in these sectors. Moreover, the sectors where the disparity in intensity results in the greatest overuse of energy include beverage and tobacco manufacturing, transportation equipment manufacturing, miscellaneous manufacturing, computer and electronic product manufacturing, and nonmetallic mineral product manufacturing (Exhibit 3).

*Energy intensity is the measure of energy consumed in British Thermal Units (Btu) per dollar of Gross Domestic Product (GDP) earned. GDP is equivalent to the value added to a manufactured good. Exhibit 3 details the relative energy intensity of five industries compared to the national average.

Exhibit 2: Value of Shipments across Each Census Region

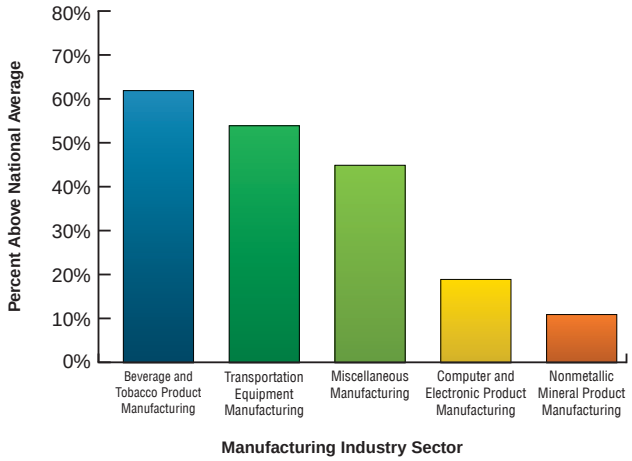
NAICS Code	Manufacturing Sector Description	Value of Shipments by Census Region ($1,000s)			
		Midwest	Northeast	South	West
311	Food	$204,666,920	$65,793,261	$167,671,682	$98,574,804
312	Beverage & Tobacco Products	$17,311,076	$10,376,689	$67,096,187	$24,179,977
313	Textile Mills	$1,098,299	$4,963,887	$27,712,405	$1,970,605

NAICS Code	Manufacturing Sector Description	Value of Shipments by Census Region ($1,000s)			
		Midwest	Northeast	South	West
314	Textile Product Mills	$2,735,095	$3,349,553	$22,290,390	$3,322,493
315	Apparel	$1,613,014	$6,799,668	$9,979,108	$10,774,562
316	Leather & Allied Products	$1,416,708	$1,144,563	$689,199	$832,329
321	Wood Products	$23,771,713	$11,108,678	$48,983,012	$28,098,923
322	Paper	$47,115,379	$28,350,897	$69,983,012	$20,686,685
323	Printing & Related Activites	$35,013,054	$21,770,053	$25,769,420	$16,141,181
324	Petroleum & Coal Products	$81,870,541	$46,307,975	$275,272,040	$91,124,660
325	Chemicals	$138,746,405	$122,465,240	$342,698,414	$51,185,822
326	Plastic & Rubber Products	$75,452,678	$29,422,093	$79,933,459	$26,167,217
327	Nonmetalic Mineral Products	$32,037,818	$17,491,499	$50,065,523	$25,597,119
331	Primary Metals	$92,601,422	$40,650,773	$77,814,960	$21,484,148
332	Fabricated Metal Products	$118,929,503	$52,537,662	$99,115,323	$46,303,596
333	Machinery	$143,226,056	$44,898,571	$104,749,626	$33,294,459
334	Computer & Electronic Products	$62,566,287	$64,150,714	$118,927,414	$144,802,804
335	Electrical Equipment & Appliances	$43,387,114	$19,417,128	$44,584,064	$11,071,376
336	Transportation Equipment	$331,468,454	$45,738,269	$225,728,247	$95,807,598
337	Furniture	$27,548,271	$10,243,628	$32,353,880	$14,888,967
339	Miscellaneous	$37,948,982	$37,022,053	$34,738,984	$39,342,698

Source: U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

This lower-than-average energy intensity in the Northeast is partly a result of higher than average energy prices for industry (Exhibit 4). The Northeast's industrial energy prices are $1.87 and $1.73 per million British thermal units (Btu) higher than the average energy price in the Midwest and South, respectively. Higher energy prices tend to curb greater energy consumption, and energy-intensive industries will seek to operate in geographical regions where energy prices are low. This is because large energy-consuming industries can significantly reduce their costs by locating near large sources of inexpensive energy. Despite these tendencies, there are some anomalies where the Northeast experiences higher-than-average energy intensities in spite of the higher energy prices. This report will focus on five of those sectors.

Exhibit 3: 2006 Northeastern Energy Intensity Compared to National Average Region



The Northeastern manufacturing sectors profiled in this report either have relatively high or low shipment values. All other things being equal, a product that has a higher shipment value will have a lower energy intensity due to the GDP influence on both energy intensity and the relative value of shipments for a given product. Since the relatively high value products make the energy intensities appear lower, the Northeast has great potential to make improvements in the sectors where this lowering influence is eclipsed by a significantly higher than average energy intensity. The inverse is true for the sectors in the Northeast with lower shipment values. The lower shipment value in some of the sectors is a contributing factor to a possible higher energy intensity compared to the national average. All other things being equal, a product that has a lower shipment value will have a higher energy intensity.

Exhibit 4: 2006 Regional Average Industrial Energy Prices

Region	Average Industrial Sector Energy Price ($/Million Btu)
Midwest	$10.85
Northeast	$13.51
West	$12.72

Source: Energy Information Administration, State Energy Data System, Tables S6 and S4a, November 2008. www.eia.doe.gov/emeu/states/_seds.html

The Northeast's higher-value products—as evidenced by the GDP–Material Inputs ratio (Appendices A and B)—counter the much higher energy intensities for Northeastern products, emphasizing any disparities that do exist. Whereas the lower value of Northeastern products in other sectors do not justify the significantly higher energy intensities. This concept is further supported by details in each section of this report.

Harnessing energy efficiency as a resource will provide the Northeast with an energy source alternative to the historical approach of solely increasing energy supply. Reducing energy consumption will save manufacturers money in the short term by reducing monthly energy bills. Long-term energy cost-savings will also result from investments in energy efficiency rather than energy supply. The adoption of energy efficiency technologies is highly dependent on avoided costs by consumers and utilities. When avoided costs are greater than the cost of energy efficiency technologies, adopting these technologies will become a more attractive option for industrial energy consumers. When avoided costs are lower than the cost of implementing the energy efficiency technologies, however, customers will find more value in simply consuming the energy without investing in these technologies. In addition, Energy prices are the most significant point of reference in considering cost avoidance. Electricity and natural gas prices are especially important because these energy sources are the most widely used. These prices vary greatly depending on geographic location and must be considered on a regional and state basis.

Energy costs will lower by reducing the amount of energy generation and transmission that occurs. Furthermore, pending carbon legislation in the United States also proposes the reduction of energy supply value compared to energy demand savings over the long term as the pending legislation would increase the price of energy and the cost of using energy.

Aggregating the short- and long-term energy savings means a more profitable and competitive Northeastern industrial manufacturing sector, both now and in the future. Additionally, investing in energy efficiency will insulate Northeast industry from fossil energy price volatility and shocks, such as Hurricane Katrina's effect on natural gas prices in 2005 and 2006. For utilities, using energy efficiency instead of traditional energy supply means energy needs can be met by making small, incremental investments in energy efficiency rather than large, risky investments in energy supply. Pending carbon legislation would further increase the need for nonemitting energy resources that would be increasingly expensive for utilities to own and operate. Meeting state and national energy consumption and greenhouse gas emissions goals will also become increasingly important.

This report will detail five Northeastern industrial manufacturing sectors with higher-than-average energy intensities: beverage and tobacco manufacturing, transportation equipment manufacturing, miscellaneous manufacturing, computer and electronic product manufacturing, and nonmetallic mineral product manufacturing. The report will provide detailed information on manufacturing industry subsectors and identify key energy-saving opportunities. Based on 2006 U.S. Census Bureau ("Census") and Energy Information Administration (EIA) data, the five sectors could have reduced energy consumption by approximately 58 trillion Btu† and saved approximately $789.1 million‡ in energy costs during 2006 at the $13.51 per million Btu level. See Appendices A and B for detailed energy-consumption data.

† Potential energy savings is determined by: Energy Consumed - Energy Consumed / (1 + Percent Difference of Northeast Energy Intensity from National Average) = Energy Savings Potential. This estimate is used throughout the report.

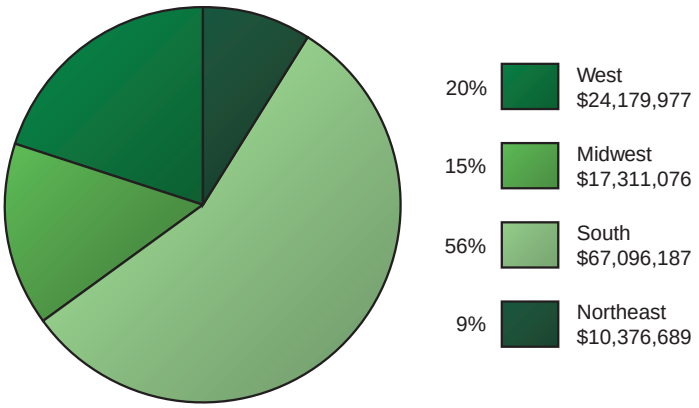
‡ Potential cost savings are determined by: Energy Savings Potential x $13.51 per Million Btu = Cost Savings. This savings assumes an average Northeast energy cost of $13.51 per million Btu as illustrated in Exhibit 4. This estimate is used throughout the report.

1.1. Beverage and Tobacco Product Manufacturing (NAICS 312)

The Northeast accounts for 9 percent of the nation's beverage and tobacco product manufacturing in terms of total value of shipments (Exhibit 5). Although the Northeast's $10.4 billion in shipment value may seem small compared to the South's $67.1 billion, there is still a significant amount of energy and economic savings that can be collected through energy intensity improvements. New York and Pennsylvania led the region in 2006 with each comprising 33 percent of total Northeast shipment values.[i]

Exhibit 5: 2006 National Beverage and Tobacco Manufacturing Shipments

(IN THOUSANDS OF DOLLARS)



Source: Energy Information Administration, State Energy Data System, Tables S6 and S4a, November 2008. www.eia.doe.gov/emeu/states/_seds.html

Beverage and tobacco product manufacturing in the Northeast has an energy intensity that is 62 percent above the national average. Whereas beverage production in the Northeast constitutes approximately 91 percent of the sector's value of shipments, tobacco production accounts for only 6 percent. Nonetheless, tobacco production in the Northeast has an astonishingly high energy intensity compared to the national average, as shown in Exhibit 6. The Northeast's tobacco sector has an energy intensity that is 748 percent above the national average, whereas beverage production is slightly below the national average energy intensity.

A portion of the high energy intensity is a result of the relatively low product value of Northeast beverage and tobacco shipments, which can be seen from the disparity

Exhibit 6: 2006 Northeastern Beverage and Tobacco Production Summary

Description (NAICS Code)	Percentage of Total Shipments	Estimated Northeast Energy Intensity (Btu/$GDP)	Estimated National Energy Intensity (Btu/$GDP)	Percent Above National Average
Beverage and Tobacco Product Manufacturing (312)	100.0%	2,194	1,352	62.3%
Beverage Manufacturing (3121)	91.2%	2,221	2,237	-0.7%
Tobacco Manufacturing (3122)	6.0%	2,807	331	748.1%

Note: Subsector percentages may not total 100 percent due to U.S. Census data withholding. Some subsectors may not be shown because of incomplete data. See Appendix A for more detailed Northeast data and Appendix B for more detailed national data and additional notes.

ratios in Exhibit 7. Although beverage manufacturing has a GDP–Material Input ratio that is higher than the national ratio, the tobacco subsector has a much lower GDP–Material Input ratio, explaining the overall beverage and tobacco GDP–Material Input ratio being lower than the nation's. Even after normalizing for this disparity in product value, the Northeast's beverage and tobacco product sector and the tobacco subsector use much more energy to produce its products compared to the rest of the nation. This is evident because the percentage difference between Northeastern and national GDP–Material Input ratios is smaller than the difference between their energy intensities.

If the Northeast's beverage and tobacco product manufacturing sector used energy at the same rate as the rest of the nation, the region could have reduced its consumption from 13 trillion Btu to 8 trillion Btu in 2006. This 5-trillion Btu energy-consumption reduction is approximately equivalent to the energy produced by 301 1.5 megawatt wind turbines[ii]. The 5-trillion Btu reduction at the $13.51-per-million-Btu price level would have yielded approximately $67.4 million in production-cost savings for the Northeastern beverage and tobacco industry.

Exhibit 7: Beverage and Tobacco *GDP–Material Input* Ratio

Description (NAICS Code)	Northeast *GDP-Material Input* Ratio	National *GDP-Material Input* Ratio
Beverage and Tobacco Product Manufacturing (312)	1.34	1.76
Beverage Manufacturing (3121)	1.24	1.08
Tobacco Manufacturing (3122)	6.38	6.82

See Appendix A for more detailed Northeast data and Appendix B for more detailed national data.

1.2. Transportation Equipment Manufacturing (NAICS 336)

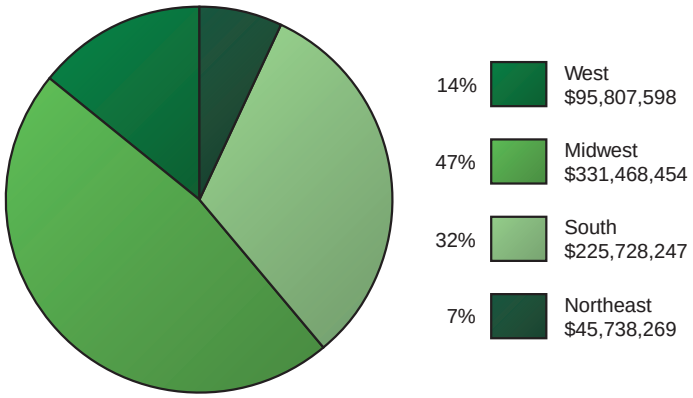
The Northeast's transportation equipment sector accounts for only 7 percent of the sector's total of value of shipments for the nation, as seen in Exhibit 8, but can account for 39 percent of the total energy and economic savings estimated within this report. In 2006, Connecticut, Pennsylvania, and New York led the region in value of shipments for transportation equipment.

The Northeast's energy intensity in its transportation equipment sector is 54 percent above the national energy intensity average (Exhibit 9). The transportation equipment sector includes manufacturing subsectors such as motor vehicles, motor vehicle body and trailer, motor vehicle parts, aerospace product and parts, railroad rolling stock, and ship and boat building. Within these subsectors, data are only available in the Northeast for aerospace product and parts manufacturing, which accounts for 29 percent of the transportation equipment sector's total value of shipments. Aerospace product and parts manufacturing has an energy intensity that is 48 percent above the national average for the subsector. This implies one or more of the other subsectors must have an energy intensity that is even further above their respective national average to account for the total 54 percent disparity seen on the 3-digit level.

The higher energy intensity seen in the Northeast's transportation equipment industry cannot be explained by lower product values. This is evidenced in Exhibit 10 where the Northeast's GDP–Material Input ratio is much higher than the national GDP–Material Input ratio, meaning the Northeast has a product value that is relatively higher than the rest of the nation. If anything, this implies the energy intensity disparity might be larger than estimated in Exhibit 9.

Exhibit 8: 2006 National Transportation Equipment Manufacturing Shipments

(IN THOUSANDS OF DOLLARS)



Source: U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

If the Northeast's transportation equipment manufacturing sector used energy at the same rate as the rest of the nation, the region could have reduced its consumption from 64 trillion Btu to 41 trillion Btu in 2006. This 23-trillion Btu energy-consumption reduction is approximately equivalent to the energy required to heat nearly a half of a million households in the United States[iv]. The 23-trillion Btu reduction would have yielded approximately $305 million in production-cost savings for the Northeastern transportation equipment industry.

Exhibit 9: 2006 Northeastern Transportation Equipment Production Summary

Description (NAICS Code)	Percentage of Total Shipments	Estimated Northeast Energy Intensity (Btu/$GDP)	Estimated National Energy Intensity (Btu/$GDP)	Percent Above National Average
Transportation Equipment Manufacturing (336)	100.0%	2,824	1,836	53.8%
Aerospace Product and Parts Manufacturing (3364)	28.8%	1,502	1,014	48.1%

Note: Subsector percentages may not total 100 percent due to U.S. Census data withholding. Some subsectors may not be shown because of incomplete data. See Appendix A for more detailed Northeast data and Appendix B for more detailed national data and additional notes.

Exhibit 10: Transportation Equipment *GDP–Material Input* Ratio

Description (NAICS Code)	Northeast *GDP-Material Input* Ratio	National *GDP-Material Input* Ratio
Transportation Equipment Manufacturing (336)	0.94	0.59
Motor Vehicle Parts Manufacturing (3363)	0.83	0.66
Aerospace Product and Parts Manufacturing (3364)	1.04	1.08
Railroad Rolling Stock Manufacturing (3365)	0.77	0.58
Ship and Boat Building (3366)	1.02	1.13
Other Transportation Equipment Manufacturing (3369)	0.88	0.59

See Appendix A for more detailed Northeast data and Appendix B for more detailed national data.

1.3. Miscellaneous Manufacturing (NAICS 339)

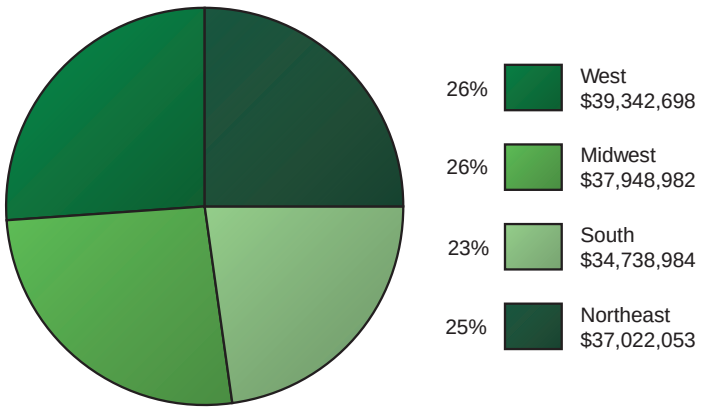
With more than $37.0 billion in shipment value, the Northeast accounts for nearly 25 percent of the nation's miscellaneous manufacturing. Exhibit 11 shows each of the four U.S. Census regions accounting for nearly an equal share of the industry. New York and Massachusetts led the Northeast in 2006, comprising 26 percent and 21 percent respectively.[v]

The Northeast's miscellaneous manufacturing sector has an energy intensity that is 44 percent above the national average and consists of two subsectors: medical equipment and supplies manufacturing and other miscellaneous manufacturing. Unfortunately, data are not available on the subsector level, so it is not possible to identify if one or both subsectors is causing the overall higher-than-average energy intensity.

The *GDP–Material Input* ratio in Exhibit 13 shows the Northeast as having a lower product value in this sector compared to the national average. This lower-than-average product value could account for part of the disparity in energy intensity, but even after normalizing for this difference in product values, the Northeast would still have an energy intensity that is significantly higher than average.

Exhibit 11: 2006 National Miscellaneous Manufacturing Shipments

(IN THOUSANDS OF DOLLARS)



Source: U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

Exhibit 12: 2006 Northeastern Miscellaneous Manufacturing Production Summary

Description (NAICS Code)	Percentage of Total Shipments	Estimated Northeast Energy Intensity (Btu/$GDP)	Estimated National Energy Intensity (Btu/$GDP)	Percent Above National Average
Miscellaneous Manufacturing (339)	100.0%	988	684	44.4%

Note: Subsector percentages may not total 100 percent due to U.S. Census data withholding. Some subsectors may not be shown because of incomplete data. See Appendix A for more detailed Northeast data and Appendix B for more detailed national data and additional notes.

Exhibit 13: Miscellaneous Manufacturing *GDP–Material Input* Ratio

Description (NAICS Code)	Northeast *GDP-Material Input* Ratio	National *GDP-Material Input* Ratio
Miscellaneous Manufacturing (339)	1.45	1.74
Medical Equipment and Supplies Manufacturing (3391)	2.09	2.37
Other Miscellaneous Manufacturing (3399)	1.08	1.27

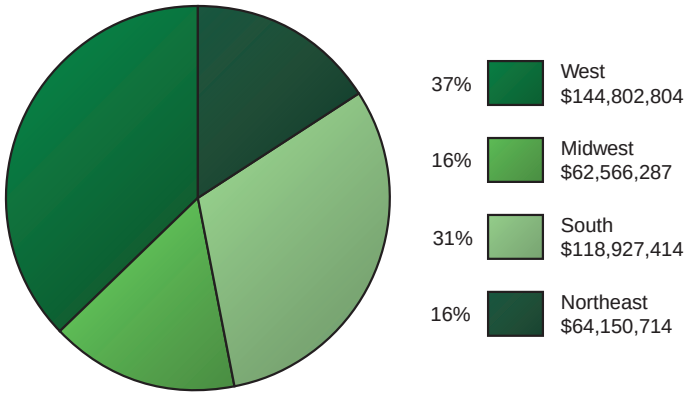
See Appendix A for more detailed Northeast data and Appendix B for more detailed national data.

If the Northeast's miscellaneous manufacturing sector used energy at the same rate as the rest of the nation, the region could have reduced its consumption from 22 trillion Btu to 15 trillion Btu in 2006. This 7-trillion Btu energy-consumption reduction is approximately equivalent to the energy produced by 422 1.5 megawatt wind turbines.[vi] The 7-trillion Btu reduction would have yielded approximately $91.4 million in production-cost savings for the Northeastern miscellaneous manufacturing sector.

1.4. Computer and Electronic Product Manufacturing (NAICS 334)

The Northeast and the Midwest both account for 16 percent of the nation's computer and electronic product manufacturing, trailing behind both the West and the South (Exhibit 14). In 2006, Massachusetts led the Northeast region in shipment value with $13.1 billion, constituting 35 percent of the region's total.[vii]

Exhibit 14: 2006 National Computer and Electronic Product Manufacturing Shipments (in thousands of dollars)



Source: U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

Exhibit 15: 2006 Northeastern Computer and Electronic Production Summary

Description (NAICS Code)	Percentage of Total Shipments	Estimated Northeast Energy Intensity (Btu/$GDP)	Estimated National Energy Intensity (Btu/$GDP)	Percent Above National Average
Computer and Electronic Product Manufacturing (334)	100.0%	723	611	18.3%

Note: Subsector percentages may not total 100 percent due to U.S. Census data withholding. Some subsectors may not be shown because of incomplete data. See Appendix A for more detailed Northeast data and Appendix B for more detailed national data and additional notes.

The computer and electronic product industry is composed of the manufacturing of computer and peripheral equipment, communications equipment, audio and video equipment, semiconductors, navigational, magnetic and optical media, and measuring, electromedical, and control instruments. The Northeast's computer and electronic product industry is comprised primarily of navigational, measuring, electromedical, and control instruments manufacturing (NAICS 3345) and semiconductor and other electronic component manufacturing (3344), respectively accounting for 39 percent and 26 percent of the industry in the region.[viii] The Northeast's energy intensity in the computer and electronic product industry is 18 percent above the national average, as displayed in Exhibit 15.

A portion of the high energy intensity is a result of the relatively low product value of Northeast computer and electronic product shipments, which can be seen from the disparity between Northeastern and national GDP–Material Input ratios in Exhibit 16. Even after normalizing for this disparity in product value, the Northeast's computer and electronic product sector uses much more energy to produce its products compared to the rest of the nation.

If the Northeast's computer and electronic products sector consumed energy at the same rate as the rest of the nation, the region could have reduced its consumption from 27 to 23 trillion Btu in 2006. This 4-trillion Btu energy-consumption reduction is approximately equivalent to the energy required to drive the average passenger car 1 billion miles.[ix] It also would have yielded $56.4 million in production-cost savings for the Southern printing industry.

Exhibit 16: Computer and Electronic Product *GDP–Material Input* Ratio

Description (NAICS Code)	Northeast *GDP-Material Input* Ratio	National *GDP-Material Input* Ratio
Computer and Electronic Product Manufacturing (334)	1.37	1.44
Computer and Peripheral Equipment Manufacturing (3341)	0.63	1.08
Communications Equipment Manufacturing (3342)	1.50	1.17
Semiconductor and Other Electronic Component Manufacturing (3344)	1.63	1.83
Navigational, Measuring, Electromedical, and Control Instruments Manufacturing (3345)	1.61	1.72
Manufacturing and Reproducing Magnetic and Optical Media (3346)	1.53	0.88

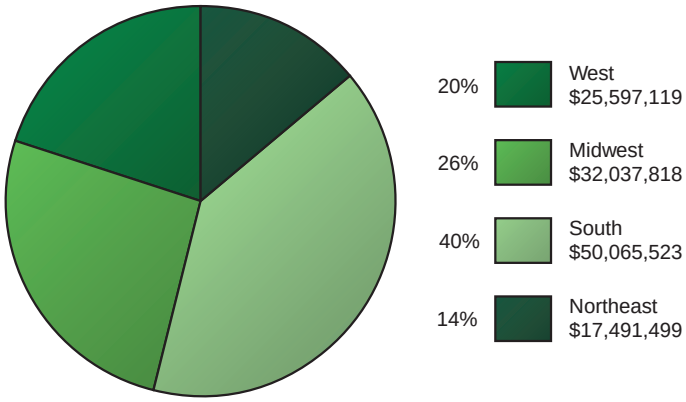
See Appendix A for more detailed Northeast data and Appendix B for more detailed national data.

1.5. Nonmetallic Mineral Product Manufacturing (NAICS 327)

Nonmetallic mineral product manufacturing in the Northeast constitutes 14 percent of the national total in terms of value of shipments and is valued at $17.5 billion (Exhibit 17). Pennsylvania, New York, and New Jersey led the Northeast's production in 2006, accounting for 80 percent of the region's total shipments.[x]

Exhibit 17: National Nonmetallic Mineral Product Manufacturing Shipments

(IN THOUSANDS OF DOLLARS)



Source: U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

The nonmetallic mineral product industry includes manufacturing subsectors such as clay products, glass and glass products, cement and concrete products, lime and gypsum products, and other nonmetallic mineral products. The nonmetallic mineral product sector in the Northeast has an energy intensity that is more than 13 percent above the national average (Exhibit 18).

This higher-than-average energy intensity cannot be explained by a difference in product value, since the GDP–Material Input ratio for the Northeast in Exhibit 19 is higher than the national GDP–Material Input ratio. This indicates the Northeast's energy intensity could be higher than estimated in Exhibit 18 due to its higher product value.

If the Northeast's nonmetallic mineral product sector used energy at the same rate as the rest of the nation, the region could have reduced its consumption from 182 trillion Btu to 162 trillion Btu in 2006. This 20-trillion Btu energy-consumption reduction is approximately equivalent to the energy required to heat 0.4 million households in the United States.[xi] The 20-trillion Btu reduction would have yielded approximately $269.1 million in production-cost savings for the Northeastern miscellaneous manufacturing sector.

Exhibit 18: 2006 Northeastern Nonmetallic Mineral Production Summary

Description (NAICS Code)	Percentage of Total Shipments	Estimated Northeast Energy Intensity (Btu/$GDP)	Estimated National Energy Intensity (Btu/$GDP)	Percent Above National Average
Nonmetallic Mineral Product Manufacturing (327)	100.0%	17,980	15,888	13

Note: Subsector percentages may not total 100 percent due to U.S. Census data withholding. Some subsectors may not be shown because of incomplete data. See Appendix A for more detailed Northeast data and Appendix B for more detailed national data and additional notes.

Exhibit 19: Nonmetallic Mineral Product *GDP–Material Input* Ratio

Description (NAICS Code)	Northeast *GDP-Material Input* Ratio	National *GDP-Material Input* Ratio
Nonmetallic Mineral Product Manufacturing (327)	1.38	1.32
Clay Product and Refractory Manufacturing (3271)	1.36	1.76
Glass and Glass Product Manufacturing (3272)	1.43	1.21
Cement and Concrete Product Manufacturing (3272)	1.23	1.20
Other Nonmetallic Mineral Product Manufacturing (3279)	1.52	1.60

See Appendix A for more detailed Northeast data and Appendix B for more detailed national data.

2. Moving Forward

The Northeast's potential for efficiency improvements in its industrial manufacturing sector should be viewed as a significant energy resource. The industries profiled in this report could reduce operating costs significantly by lowering energy intensity to national average levels. A summary of additional benefits are presented in the box to the right.

It should be emphasized that the energy and economic savings estimated in this report are based on the Northeast merely lowering its energy intensity to the national average that existed in 2006. These estimates do not include the possible savings that could result from the Northeast implementing additional energy efficiency improvements that would allow the region to lead the nation in terms of energy intensity. If the Northeast's energy intensities were at parity with the national average in these five industries, the Northeast would have reduced energy consumption by 58 trillion Btu and saved approximately $78.1 million in the process. The 58 trillion Btu in energy savings is equivalent to the annual energy required to heat approximately one million households in the United States. Exhibit 20 contains the 2006 energy consumption of each of the five sectors detailed in this report, along with the potential energy savings and energy consumption if these sectors were to operate with energy intensities equal to the national average for each sector. Additional savings can be realized by moving below national average levels to lead in energy efficiency, as well as product shipments.

ADDITIONAL BENEFITS

- Reducing short-term manufacturer energy costs by lowering energy bills through conservation
- Increasing manufacturer competitiveness through reduced operating costs
- Reducing long-term manufacturer energy costs by reducing spending on generation and transmission
- Insulating Northeastern manufacturing sectors from fossil-energy price volatility and shocks
- Reducing utility investment risk by using energy efficiency measures instead of traditional energy supply
- Meeting state and national utility goals for energy resource and greenhouse gas emissions.

Exhibit 20: Potential Energy and Economic Savings with National Average Energy Intensities

Manufacturing Sector Description	Energy Saved in Trillion Btus if at National Average	Economic Savings in Millions
Beverage and Tobacco Products (NAICS 312)	5	$67.4
Transportation Equipment (NAICS 336)	23	$305.7
Miscellaneous Manufacturing (NAICS 339)	7	$91.4
Computer and Electronic Products (NAICS 334)	4	$56.4
Nonmetallic Mineral Products (NAICS 327)	20	$269.1

The Northeast can become a stronger national leader in energy intensity by making changes to the way it consumes energy. Utilities, government organizations, nongovernmental organizations, and energy consumers must make an effort to support programs that reduce energy consumption, save money, and increase industry competitiveness. Improving processes and reducing energy consumption will help to strengthen the Northeast's position as a leader in energy efficiency.

3. Appendices

Appendix A: Northeastern Manufacturing Sector and Subsector Details

NAICS Code	Energy Saved in Trillion Btus if at National Average	Material Inputs ($1,000)	Value of Shipments ($1,000)	GDP ($1,000)	Energy Consumed (Trillion Btu)	Energy Intensity (Btu/ $GDP)	*GDP-Material Input* Ratio
312	Beverage and Tobacco Product Manufacturing	$4,436,471	$10,376,689	$5,924,852	13	2,194	1.34
3121	Beverage Manufacturing	$4,358,014	$9,776,216	$5,402,598	12	2,221	1.24
3122	Tobacco Manufacturing	$55,888	$411,951	$356,290	1	2,807	6.38
327	Nonmetallic Mineral Product Manufacturing	$7,338,081	$17,491,499	$10,122,201	182	17,980	1.38
3271	Clay Product and Refractory Manufacturing	$483,303	$1,169,115	$659,347	-	-	1.36
3272	Glass and Glass Product Manufacturing	$1,525,559	$3,727,165	$2,186,038	83	37,968	1.43
3273	Cement and Concrete Product Manufacturing	$3,148,873	$7,031,393	$3,874,948	-	-	1.23
3274	Lime and Gypsum Product Manufacturing	-	-	-	14	-	-
3279	Other Nonmetallic Mineral Product Manufacturing	$1,204,905	$3,021,394	$1,828,225	-	-	1.52
334	Computer and Electronic Product Manufacturing	$27,304,616	$64,150,714	$37,358,216	27	723	1.37
3341	Computer and Peripheral Equipment Manufacturing	$3,311,049	$5,192,282	$2,093,227	-	-	0.63
3342	Communications Equipment Manufacturing	$3,729,094	$9,225,317	$5,584,890	-	-	1.50
3343	Audio and Video Equipment Manufacturing	$0	$0	$0	-	-	-
3344	Semiconductor and Other Electronic Component Manufacturing	$6,372,344	$16,733,869	$10,412,882	-	-	1.63

 Values are estimates and may be slightly over or understated due to Census and EIA data availability.

NAICS Code	Energy Saved in Trillion Btus if at National Average	Material Inputs ($1,000)	Value of Shipments ($1,000)	GDP ($1,000)	Energy Consumed (Trillion Btu)	Energy Intensity (Btu/ $GDP)	GDP-Material Input Ratio
3346	Manufacturing and Reproducing Magnetic and Optical Media	$86,797	$804,660	$133,193	-	-	1.53
336	Transportation Equipment Manufacturing	$24,210,510	$45,738,269	$22,666,404	64	2,824	0.94
3361	Motor Vehicle Manufacturing	-	-	-	-	-	-
3362	Motor Vehicle Body and Trailer Manufacturing	-	-	-	-	-	-
3363	Motor Vehicle Parts Manufacturing	$6,071,334	$11,079,497	$5,010,749	-	-	0.83
3364	Aerospace Product and Parts Manufacturing	$7,068,756	$13,171,136	$7,324,012	11	1,502	1.04
3365	Railroad Rolling Stock Manufacturing	$2,646,323	$4,690,552	$2,026,047	-	-	0.77
3366	Ship and Boat Building	$1,079,018	$2,179,723	$1,100,705	-	-	1.02
3369	Other Transportation Equipment Manufacturing	$1,258,999	$2,348,898	$1,105,993	-	-	0.88
339	Miscellaneous Manufacturing	$15,305,551	$37,022,053	$22,261,241	22	988	1.45
3391	Medical Equipment and Supplies Manufacturing	$5,646,968	$17,062,474	$11,811,918	-	-	2.09
3399	Other Miscellaneous Manufacturing	$9,636,982	$19,904,274	$10,417,556	-	-	1.08

Sources: U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376. EIA, 2006 Manufacturing Energy Consumption Survey, Table 1.2. www.eia.doe.gov/emeu/mecs/mecs2006/2006tables.html.

Appendix B: National Manufacturing Sector and Subsector Details

NAICS Code	Energy Saved in Trillion Btus if at National Average	Material Inputs ($1,000)	Value of Shipments ($1,000)	GDP ($1,000)	Energy Consumed (Trillion Btu)	Energy Intensity (Btu/ $GDP) □	*GDP-Material Input* Ratio
312	Beverage and Tobacco Product Manufacturing	$44,986,194	$124,032,571	$79,167,757	109	1,377	1.76
3121	Beverage Manufacturing	$39,666,621	$82,443,196	$42,905,835	96	2,237	1.08
3122	Tobacco Manufacturing	$5,319,574	$41,589,375	$36,261,921	12	331	6.82
327	Nonmetallic Mineral Product Manufacturing	$54,735,684	$126,263,424	$72,131,997	1146	15,888	1.32
3271	Clay Product and Refractory Manufacturing	$3,294,836	$9,037,527	$5,784,251	-	-	1.76
3272	Glass and Glass Product Manufacturing	$10,798,069	$23,760,248	$13,092,448	-	-	1.21
3273	Cement and Concrete Product Manufacturing	$29,423,782	$64,463,203	$35,334,281	-	-	1.20
3274	Lime and Gypsum Product Manufacturing	$3,530,679	$9,104,267	$5,597,894	-	-	1.59
3279	Other Nonmetallic Mineral Product Manufacturing	$7,688,318	$19,898,179	$12,323,123	-	-	1.60
334	Computer and Electronic Product manufacturing	$159,921,464	$390,812,961	$230,761,781	141	611	1.44
3341	Computer and Peripheral Equipment Manufacturing	$32,591,840	$67,402,725	$35,049,251	-	-	1.08
3342	Communications Equipment Manufacturing	$31,455,576	$70,194,633	$36,906,418	-	-	1.17
3343	Audio and Video Equipment Manufacturing	$6,299,266	$9,587,769	$3,278,438	-	-	0.52
3344	Semiconductor and Other Electronic Component Manufacturing	$41,686,875	$117,688,337	$76,460,226	-	-	1.83
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	$44,181,777	$118,994,088	$75,807,821	-	-	1.72

□ Values are estimates and may be slightly over or understated due to Census and EIA data availability.

NAICS Code	Energy Saved in Trillion Btus if at National Average	Material Inputs ($1,000)	Value of Shipments ($1,000)	GDP ($1,000)	Energy Consumed (Trillion Btu)	Energy Intensity (Btu/ $GDP)	GDP-Material Input Ratio
336	Transportation Equipment Manufacturing	$442,242,003	$699,034,220	$260,882,742	479	1,836	0.59
3361	Motor Vehicle Manufacturing	$196,030,689	$261,860,058	$66,045,757	-	-	0.34
3362	Motor Vehicle Body and Trailer Manufacturing	$22,717,166	$36,015,758	$13,474,840	-	-	0.59
3363	Motor Vehicle Parts Manufacturing	$122,031,484	$202,298,964	$80,485,945	-	-	0.66
3364	Aerospace Product and Parts Manufacturing	$70,267,186	$143,003,326	$75,906,290	77	1,014	1.08
3365	Railroad Rolling Stock Manufacturing	$7,779,299	$12,082,276	$4,479,708	-	-	0.58
3366	Ship and Boat Building	$12,446,418	$26,510,585	$14,064,167	-	-	1.13
3369	Other Transportation Equipment Manufacturing	$10,969,762	$17,263,253	$6,426,335	-	-	0.59
339	Miscellaneous Manufacturing	$55,499,320	$150,480,515	$96,477,162	66	684	1.74
3391	Medical Equipment and Supplies Manufacturing	$23,591,030	$78,486,050	$55,890,882	-	-	2.37
3399	Other Miscellaneous Manufacturing	$31,908,290	$71,994,465	$40,556,280	-	-	1.27

Sources: U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376. EIA, 2006 Manufacturing Energy Consumption Survey, Table 1.2. www.eia.doe.gov/emeu/mecs/mecs2006/2006tables.html.

4. Endnotes

[i] U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

[ii] Energy Information Administration, "Renewable Fuels Module", assuming 37 percent capacity. http://www.eia.doe.gov/oiaf/aeo/assumption/pdf/renewable.pdf

[iii] U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

[iv] Energy Information Administration, Annual Energy Outlook, Table 4. http://www.eia.doe.gov/oiaf/aeo/pdf/aeotab_4.pdf

[v] U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

[vi] Energy Information Administration, "Renewable Fuels Module", assuming 37 percent capacity. http://www.eia.doe.gov/oiaf/aeo/assumption/pdf/renewable.pdf

[vi] U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

[vii] U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

[viii] U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

[ix] Energy Information Administration, Transportation Energy Consumption Surveys, http://www.eia.doe.gov/emeu/rtecs/contents.html Table A1. U.S. Number of Vehicles, Vehicle-Miles, Motor Fuel Consumption and Expenditures, 2001

[x] U.S. Census Bureau, 2006 Annual Survey of Manufactures, Stats for All Mfg by State. http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=EAS&_tabId=EAS1&_submenuId=datasets_5&_lang=en&_ts=266925692376

[xi] Energy Information Administration, Annual Energy Outlook, Table 4. http://www.eia.doe.gov/oiaf/aeo/pdf/aeotab_4.pdf

[xii] Energy Information Administration, Annual Energy Outlook, Table 4. http://www.eia.doe.gov/oiaf/aeo/pdf/aeotab_4.pdf

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