The Contributions of Insulation to the U.S. Economy in 2017

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

- The use of insulation in U.S. homes and businesses saves energy, putting more money in the pockets of home and business owners. In addition, by consuming less energy, the use of insulation translates directly into the reduction of greenhouse gas emissions.

- Beyond the benefits of the use of insulation, the insulation industry—including the manufacture, distribution, and installation of insulation—generates more than 500,000 jobs in the U.S. and over $30 billion in payrolls that support families and local communities around the country.

- Insulation manufacturing is a $13.9 billion business, and directly employs more than 37,000 people across 42 states.

- Indirectly, through its purchases of supplies, raw materials, equipment, and services, insulation manufacturing supports an additional 52,000 jobs in supply-chain industries. Through the household spending of the wages and salaries paid to workers in insulation manufacturing and their suppliers, an additional 60,000 payroll-induced jobs are supported.

- The combined direct and indirect economic activity from U.S. insulation manufacturing supports nearly 150,000 jobs. These jobs generate payrolls of $8.2 billion. In addition, the combined economic activity supported by insulation manufacturing contributes $1.2 billion to state and local governments and $2.4 billion in federal tax revenues.

THE INSULATION INDUSTRY IN THE U.S.

Insulation is installed in homes and businesses around the country to keep hot things hot and cold things cold. There are various applications of insulation, including:

- **Residential insulation** – attics, walls, floors and crawl spaces, roofs, doors and windows are insulated to reduce air leaks and increase energy efficiency.

- **Nonresidential insulation** – in commercial and industrial buildings, insulation of roofs and walls (building envelope) saves on heating and cooling costs.

- **Appliances** – refrigerators, freezers, ovens, dishwashers, and hot water heaters are constructed with insulation to reduce thermal transfer.

- **Motor Vehicles** – insulation in body panels, roof, floor, trunk, hood, and door panels is used to dampen vibration, heat, and sound.

- **Equipment/Mechanical** – insulating pipes, tanks, and other mechanical systems reduce energy consumption, promote employee and public safety, protect the environment, and contribute to the competitiveness of U.S. industry by lowering operating and production costs.

Insulation Materials

Insulation comes in many forms, depending on what is being insulated, where it is located, and other factors. Insulation is made from a variety of materials, each with a unique set of properties (i.e., R value,[1] ability to create complex shapes, and ease of installation). The most commonly used materials in insulation products are (in alphabetical order):

- **Cellulose** – plant fibers often made from recycled newspapers, paperboard, and paper. The cellulose source is shredded and mixed with other ingredients to enhance product use and performance. It is installed as loose fill or mixed with a water to be applied in a spray.

- **Fiberglass** – a fluffy, wool-like material made from spun fibers of molten glass. The intertwined fibers of fiberglass insulation can be installed as loose fill or rolled into blankets or batts. It can also be made into board formed into shapes like pipe insulation.

- **Mineral wool** – a wool-like material made from spun fibers of molten minerals (including rock and blast furnace slag). It can be installed as loose fill, pressed into blankets, boards or batts, or formed into shapes like pipe/equipment insulation.

- **Polyisocyanurate foam (polyiso)** – a plastic foam made from the combination of several chemicals reacted to generate a closed-cell, rigid foam. It is often manufactured in boards with a variety of facing materials or encapsulated in panels or fabricated from large buns into pipe/equipment insulation.

- **Polystyrene foam** – a plastic foam made from an expanded polymer of styrene. It is generally formed into blocks which are cut into panels or into pipe/equipment insulation.

- **Polyurethane foam** – a plastic foam generated by a chemical reaction among several chemicals. For insulation, the chemicals are sprayed on site where the foaming process fills cavities and gaps. The foam can also be molded into shapes or poured into cavities to insulate appliances and other equipment.

- **Other materials** – including phenolic cellular foams, cellular glass, ceramic fiber, needled glass, elastomeric, polyethylene/polyolefin and granular materials (calcium silicate, expanded perlite, and flexible aerogel and microporous mineral materials) that are used predominantly in mechanical insulation applications.

[1] An insulating material's resistance to conductive heat flow is measured or rated in terms of its thermal resistance or R-value -- the higher the R-value, the greater the insulating effectiveness. The R-value depends on the type of insulation, its thickness, and its density. When calculating the R-value of a multilayered installation, add the R-values of the individual layers. Installing more insulation in your home increases the R-value and the resistance to heat flow. (U.S. Department of Energy)

ENVIRONMENTAL AND ECONOMIC BENEFITS OF INSULATION PRODUCTS

The insulation industry is essential to the quest for energy independence by reducing energy consumption and energy-related greenhouse gas emissions. By lowering energy consumption, and thus energy bills, insulation helps make businesses more competitive and gives households more spending power. In addition, insulation reduces outside noise, reduces entryways for pollen and insects, allows for better humidity control, lowers the chance for ice dams in snowy climates in buildings and promotes employee and public safety by helping to control operating temperatures in industrial facilities. While these benefits are enormous, they are difficult to quantify. The savings from insulation accrue to individual projects and businesses and depend on climate and the R value (or resistance to conductive heat flow) which makes it difficult to aggregate across the economy. Some of the estimated benefits of insulation include:

- The U.S. Environmental Protection Agency's (EPA) Energy Star program estimates that by adding insulation and sealing air leaks, the average household could save 15% on heating and cooling costs.[2]
- In a 2009 analysis by McKinsey that examined multiple chemistry-enabled technologies to reduce emissions,[3] the authors concluded "insulation alone accounted for 40% of the total identified CO_2e savings."
- According to the Department of Energy, "Space heating and cooling account for almost half of a home's energy use, while water heating accounts for 18%, making these some of the largest energy expenses in any home."[4]
- The heating and cooling of commercial buildings, e.g., office, retail, educational, health-care buildings and lodging, accounts for nearly 10% of all energy consumed in the U.S. [5]
- According to the Business of Council for Sustainable Energy, U.S. energy productivity grew 16% between 2007 and 2016.[6] The use of insulation products across the economy is a key contribution to energy productivity growth.
- In 2009, the National Insulation Association (NIA) in collaboration with the Department of Energy's Industrial Technologies Program and Oak Ridge National Laboratory (ORNL), documented the benefits of mechanical insulation in the industrial maintenance market and examined the difference a modest increase in insulation would make in the industrial and commercial building industries. They estimated $4.8 billion in energy savings, a reduction of 43 million metric tons of CO_2 emissions was possible. [7]

In addition to creating economic and environmental benefits through its use, the manufacture, distribution, and installation of insulation also generates economic activity and supports jobs in the U.S.

[2] https://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_methodology
[3] McKinsey, "Innovations for Greenhouse Gas Reductions: A life cycle quantification of carbon abatement solutions enabled by the chemical industry." July 2009.
[4] https://energy.gov/energysaver/heat-and-cool
[5] http://aceee.org/sector/commercial
[6] http://www.bcse.org/wp-content/uploads/BCSE-2017-Sustainable-Energy-in-America-Factbook-Brochure.pdf
[7] http://www.insulation.org/io/articles/mechanical-insulation-can-save-4-8-billion-in-energy-costs-and-43-million-metric-tons-of-co2-emissions-and-create-89000-green-jobs-per-year/

ECONOMIC SNAPSHOT OF THE INSULATION INDUSTRY

Table 1 – Economic Snapshot of the Insulation Industry (2017)

	Employment	Payroll ($ billion)
Insulation Manufacturing	37,189	$2.1
Distribution/Wholesale	44,573	$2.9
Installation	448,101	$25.7
Total	**529,863**	**$30.7**

ECONOMIC CONTRIBUTIONS OF THE U.S. INSULATION INDUSTRY

The insulation manufacturing industry takes raw materials such as, glass, rock, slag, isocyanates, polyols, recycled paper and other products and converts these materials into energy-saving insulation products. This analysis examines seven basic classes of insulation materials: polystyrene, polyurethane, polyisocyanurate (polyiso), fiberglass, mineral wool, cellulose, and other materials, predominantly used in mechanical insulation applications In 42 states around the country, more than 37,000 workers are engaged in this essential economic activity. Table 2 presents the direct employment, payroll, and output associated with these main segments of insulation manufacturing. In addition to the manufacture of insulation products, the manufacture of accessories for mechanical insulation and laminated metal building insulation also create jobs and economic activity.

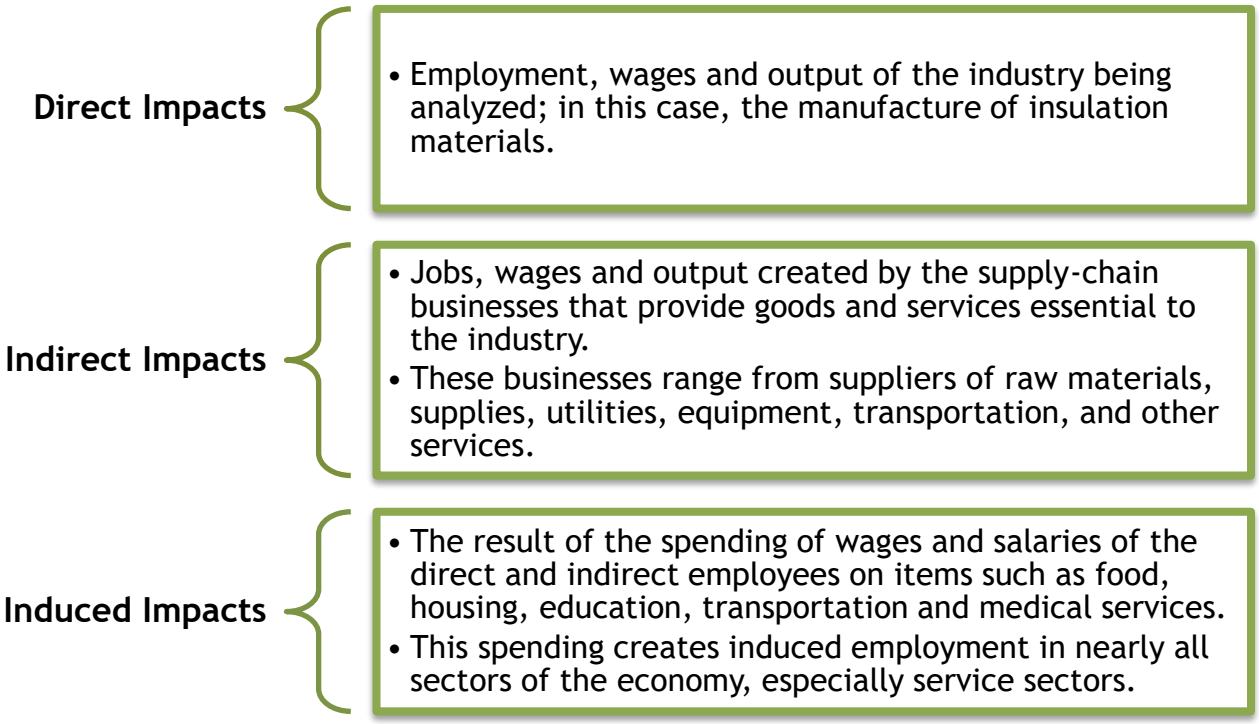
Table 2 – Insulation Products Manufacturing (2017)

	Employment	Payroll ($ billions)	Output ($ billions)
Polystyrene	3,895	$0.2	$1.6
Polyurethane/Polyiso	10,907	$0.5	$4.9
Fiberglass/Mineral wool	16,900	$1.1	$5.7
Cellulose	1,836	$0.1	$0.3
Other*	3,650	$0.2	$1.4
Total Manufacturing	**37,189**	**$2.1**	**$13.9**
Addenda			
Accessories for Mechanical Insulation Systems	*4,250*	*$0.2*	*$0.7*
Laminated Metal Building Insulation	*2,152*	*$0.1*	*$0.3*

***** includes materials not listed above that are used predominantly in mechanical insulation applications, including phenolic cellular foams, cellular glass, ceramic fiber, needled glass, elastomeric, polyethylene/polyolefin and granular materials (calcium silicate, expanded perlite, and flexible aerogel and microporous mineral materials).

The value and contributions of insulation manufacturing do not just accrue to the manufacturers. Economic activity is supported both upstream (through supply chain impacts) and downstream as manufactured insulation products move through distribution/wholesale channels to the contractors whose business includes installing insulation.

Upstream Economic Impact



The economic contributions of the insulation manufacturing were analyzed using an economic input-output model, IMPLAN.[8] This method estimates the total contributions of an industry to the economy at the state and national levels for a given year. The economic contributions analyzed in this report are employment, payroll and output in the U.S. for the year 2017.

The manufacture of insulation products directly generates $13.9 billion in industry shipments and directly employs 37,200 workers across 42 states. Insulation manufacturers purchase goods and services from their suppliers and their suppliers do the same. The economic impact generated by the insulation supply chain supports an additional 52,000 indirect jobs. Finally the wages paid by insulation manufacturers and their suppliers support nearly 60,000 payroll-induced jobs, jobs supported by the household spending of workers in the direct and indirect (supply-chain) segments. Thus, the economic activity from U.S. insulation manufacturing supports nearly 150,000 jobs which generate payrolls of $8.2 billion.

[8] IMPLAN (IMpact analysis for PLANning) is a complete economic assessment package providing economic resolution from the National level down to the zip code level; MIG Inc. is the sole licensor of IMPLAN.

In addition, the combined economic activity supported by insulation manufacturing contributes $1.2 billion to state and local governments and $2.4 billion in federal tax revenues.

Table 3 – Upstream Economic Impact of Insulation Manufacturing (2017)

	Employment	Payroll ($ billions)	Output ($ billions)
Direct Impact (Manufacturers)	37,189	$2.1	$13.9
Indirect Impact (Supply Chain)	51,981	$3.4	$16.4
Payroll-Induced Impact	59,879	$2.6	$9.5
Total Impact	**149,049**	**$8.2**	**$39.8**

Downstream Economic Impact

Looking downstream, more than 44,000 wholesalers distribute insulation products to contractors/installers and retailers around the country and nearly 450,000 workers are engaged in the drywall and insulation installation, nonresidential roofing, and mechanical insulation installation. Payrolls in those sectors amount to $2.9 billion and $25.7 billion, respectively. The paychecks from these workers help support families and local economies throughout the U.S.

Table 4 – Downstream Employment and Payrolls (2017)

	Employment	Payroll ($ billions)
Distribution/Wholesale		
Roofing, Siding, and Insulation Wholesalers	36,455	$2.4
Mechanical Insulation Distributors	8,118	$0.5
Total Distribution/Wholesale	**44,573**	**$2.9**
Installation/Contractors		
Drywall & Insulation Contractors - Residential	106,209	$4.5
Drywall & Insulation Contractors - Nonresidential	136,352	$8.1
Roofing Contractors - Nonresidential	107,140	$5.8
Mechanical Contractors	98,400	$7.4
Total Installation/Contractors	**448,101**	**$25.7**

CONCLUSION

The insulation industry, including manufacturers, distributors, and installers, make vital contributions to the U.S. economy. The products that they make, distribute, and install conserve precious energy resources, saving money for households and businesses. The use of insulation also has large environmental benefits as reduced energy consumption translates directly into lower emissions of greenhouse gases. In addition, through supply chain and payroll-induced impacts, the economic activity generated by American insulation manufacturing is broad and helps support local economies across the U.S. Moving through the economy, there are huge contributions in terms of jobs and payrolls generated by those businesses that distribute insulation products from manufacturers to where they will be installed. Finally, hundreds of thousands of workers make a living installing insulation in homes and businesses around the U.S.

APPENDIX – INSULATION JOBS IN THE STATES

Insulation manufacturing occurs in 42 states while distribution/wholesale and installation activities occur across all 50 states. Appendix Table 1 presents the top 10 states in each of the three main segments. Appendix Table 2 presents employment by segment for all states.

Appendix Table 1 – Top 10 States for Insulation Employment by Industry Segment (2017)

Manufacturing		Distribution/Wholesale		Installation/Contractors	
Ohio	4,862	Texas	4,080	California	63,542
Texas	3,363	Florida	3,238	Texas	41,956
Georgia	3,162	California	2,745	Florida	26,838
California	2,344	Pennsylvania	2,291	New York	25,938
Indiana	2,054	New York	2,149	Washington	15,795
Illinois	1,986	Illinois	2,080	Ohio	15,091
Pennsylvania	1,893	Virginia	2,054	Pennsylvania	14,361
Florida	1,391	North Carolina	1,830	Illinois	14,173
North Carolina	1,019	Wisconsin	1,671	Arizona	11,982
Kentucky	970	New Jersey	1,553	North Carolina	11,427
Other States	14,145	Other States	20,881	Other States	206,998
Total	37,189	**Total**	44,573	**Total**	448,101
Top 10 as % of Total	*62%*	*Top 10 as % of Total*	*53%*	*Top 10 as % of Total*	*54%*

Appendix Table 2 – Insulation Employment by Industry Segment (2017)

	Manufacturing	Distribution/ Wholesaler	Installation/ Contractors
Alabama	599	329	4,513
Alaska	38	32	573
Arizona	663	462	11,427
Arkansas	99	298	3,404
California	2,344	2,745	63,542
Colorado	422	1,373	10,672
Connecticut	339	608	4,119
Delaware	-	168	1,461
Dis. of Columbia	-	-	942
Florida	1,391	3,238	26,838
Georgia	3,162	1,400	10,783
Hawaii	-	169	2,072
Idaho	165	174	2,395
Illinois	2,054	2,149	15,795
Indiana	1,986	1,197	9,968
Iowa	457	864	5,345
Kansas	885	493	4,269
Kentucky	970	731	5,942
Louisiana	477	457	4,456
Maine	38	29	2,113
Maryland	50	533	10,643
Massachusetts	119	1,078	11,241
Michigan	888	875	10,638
Minnesota	104	1,193	8,469
Mississippi	649	291	2,734
Missouri	636	1,301	8,800
Montana	-	253	1,259
Nebraska	66	362	3,230
Nevada	501	163	7,255
New Hampshire	-	188	2,125
New Jersey	276	1,553	8,481
New Mexico	86	73	2,605
New York	681	2,291	25,938
North Carolina	1,019	1,830	11,982
North Dakota	29	88	1,150
Ohio	4,862	1,547	14,361
Oklahoma	539	421	4,745
Oregon	387	297	6,752
Pennsylvania	1,893	2,054	14,173
Rhode Island	-	88	1,345
South Carolina	854	712	5,131
South Dakota	-	138	1,199

Tennessee	338	933	8,142
Texas	3,363	4,080	41,956
Utah	947	542	6,259
Vermont	-	67	829
Virginia	810	2,080	10,773
Washington	382	750	15,091
West Virginia	813	106	1,590
Wisconsin	808	1,671	8,008
Wyoming	-	98	567
U.S.	**37,189**	**44,573**	**448,101**

NOTES ON METHODOLOGY AND SOURCES

Data on direct employment and payrolls are based on data from the Bureau of Labor Statistics (Covered Employment and Wages program). In addition, for insulation manufacturing, employment estimates were also based on results from a January 2017 survey of insulation manufacturers. Payrolls were estimated using average annual pay for industries and states multiplied by the employment estimates.

For insulation manufacturing, where data on shipments was estimated as a portion of a larger NAICS code, employment was estimated using output-to-employment ratios for that particular NAICS code supplemented with data from the survey of insulation manufactures. Employment data on mechanical insulation manufacturers was provided by the National Insulation Association (NIA). Payrolls for each segment were estimated by multiplying employment by the average annual wage for that industry.

With the exception of fiberglass/mineral wool insulation manufacturing, insulation made from other materials falls within broader NAICS codes and is not easily pulled out of existing government data. As a result, data on shipments/output of manufactured insulation products was derived from multiple sources, including the Census Bureau, IHS Chemical, the Center for the Polyurethanes Industry, Polyisocyanurate Insulation Manufacturers Association (PIMA), Cellulosic Insulation Manufacturers Association (CIMA), and NIA.

Data on employment and payroll for distributors/wholesalers is based on NAICS 42333 (Roofing, Siding, and Insulation Wholesalers). In addition, data for distributors of mechanical insulation were provided by the NIA.

Data on employment and payroll for installers and contractors is based on the following NAICS codes in addition to data from NIA on mechanical insulation installers:

NAICS 238311 – Residential drywall & insulation contractors

NAICS 238312 – Nonresidential drywall & insulation contractors

NAICS 238162 – Nonresidential roofing contractors

It was determined that these NAICS classifications represent a large share of the insulation installation segment. Drywall installation is included in NAICS 238311 and 238312. While no data exists to separate insulation contractors from drywall contractors, it is likely that a majority of these contractors are engaged in both lines of business. In addition, it should be noted that insulation is also installed by self-employed handymen and homeowners that are not included in industry employment data. Because roofs are a significant source of energy losses in commercial buildings, most roofing contractors are also engaged in insulation installment as part of a commercial roofing project. Though likely significant, installers of insulation in appliances, industrial equipment, mechanical systems, transportation equipment, etc. are not included due to a lack of data.

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