The Contributions of Insulation to the U.S. Economy in 2020

Economics & Statistics Department
American Chemistry Council
August 2021

TABLE OF CONTENTS

EXECUTIVE SUMMARY

- The use of insulation in U.S. homes and businesses saves energy by reducing the need to heat and cool buildings, putting more money in the pockets of home and business owners. In addition, by saving energy, the use of insulation directly reduces greenhouse gas emissions associated with producing energy to heat and cool buildings.

- Beyond the benefits of the use of insulation, the insulation industry—including the manufacture, distribution, and installation of insulation—generates more than 550,000 jobs in the U.S. and nearly $36 billion in payrolls that support families and local communities around the country.

- Insulation materials manufacturing is a $17.8 billion business, and directly employs more than 39,000 people across 45 states. Further downstream, more than 9,000 jobs are provided in the manufacturing of accessories and fabricated insulation panels.

- Indirectly, through its purchases of supplies, raw materials, equipment, and services, insulation manufacturing supports an additional 54,100 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 58,800 payroll-induced jobs are supported.

- The combined direct and indirect economic activity from U.S. insulation materials manufacturing supports nearly 152,000 jobs. These jobs generate payrolls of $10.0 billion. In addition, the combined economic activity supported by insulation materials manufacturing contributes $1.7 billion to state and local governments and $2.7 billion in federal tax revenues.

THE INSULATION INDUSTRY IN THE U.S.

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

- **Residential insulation** – attics, walls, floors, 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 exterior 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 noise, heat, and sound.

- **Equipment/Mechanical** – insulating pipes, tanks, and other mechanical systems reduces energy consumption, promotes employee and public safety, minimizes environmental impacts, and contributes 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, ability to form air barriers, ability to control moisture, 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.

[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)

- **Polyisocyanurate (polyiso) foam** – 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.

- **Expanded Polystyrene (EPS) Foam** - a closed-cell foam plastic, made from an expandable polystyrene resin using low global warming potential blowing agent pentane. Post-consumer and post-industrial material can be used to produce recycled content product. EPS is commonly molded in large blocks which are cut into sheets or shapes to suit various applications.

- **Extruded Polystyrene (XPS) Foam -** a cellular plastic product manufactured in a one stage process by extrusion and expansion of the base polymer in the presence of blowing agent(s) resulting in a product which is rigid with closed cellular structure, well suited for compressive strength, moisture resistance and the prevention of mold, mildew and corrosion.

- **Polyurethane foam** – a plastic foam generated by a 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.

ENVIRONMENTAL AND ECONOMIC BENEFITS OF INSULATION PRODUCTS

The insulation industry is essential to the fight against climate change and the quest for energy independence because its products help reduce 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 intrusion of outside noise, pollen and insects, allows for better humidity control, lowers the chance for ice dams in snowy climates, and promotes employee and public safety. 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]

[2] https://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_methodology

- 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_2 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 17.6% over the past decade.[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 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 and 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.

ECONOMIC SNAPSHOT OF THE INSULATION INDUSTRY

Table 1 – Economic Snapshot of the Insulation Industry (2020)

	Employment	Payroll ($ billion)
Insulation Manufacturing	39,006	$2.6
Distribution/Wholesale	47,344	$3.5
Installation	464,089	$29.8
Total	**550,439**	$35.9

[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] https://www.bcse.org/factbook/
[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 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 45 states around the country, more than 39,000 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.

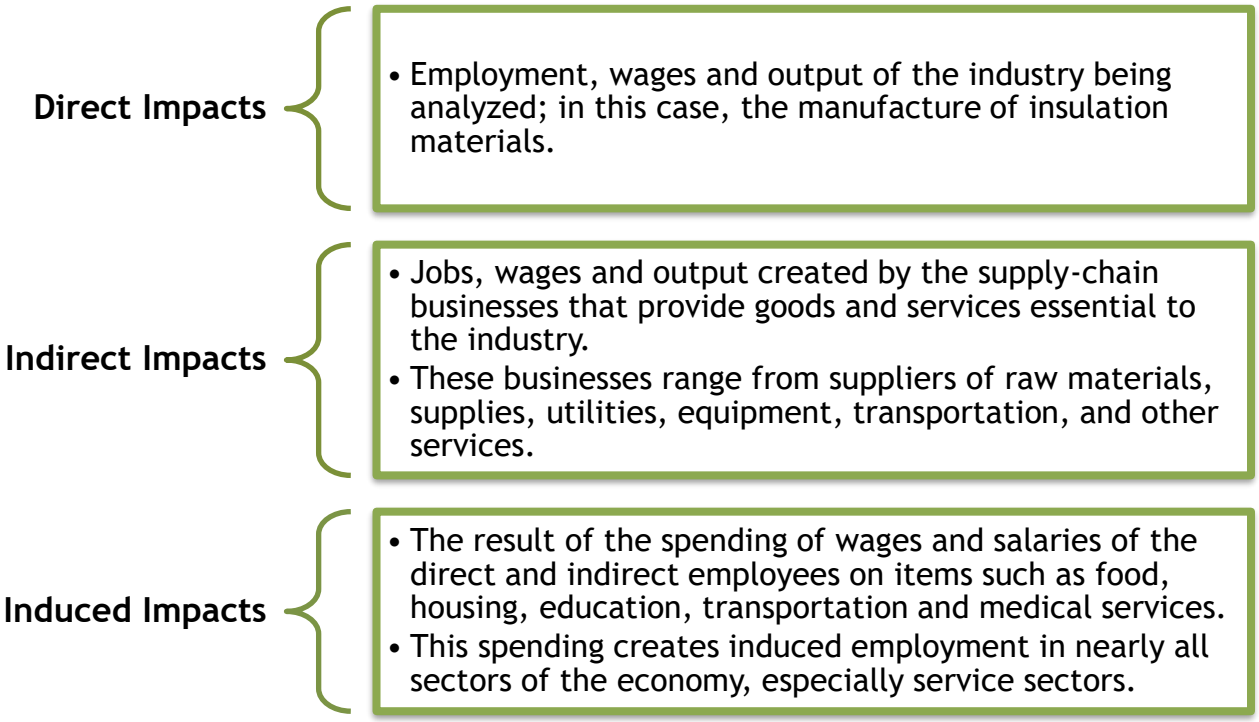
Table 2 – Insulation Materials Manufacturing (2020)

	Employment	Payroll ($ billions)	Output ($ billions)
Polystyrene (EPS & XPS)	5,875	$0.4	$2.6
Polyurethane/Polyiso	12,160	$0.7	$7.4
Fiberglass/Mineral wool	16,563	$1.3	$6.0
Cellulose	1,152	$0.1	$0.4
Other*	3,256	$0.3	$1.3
Total Manufacturing	**39,006**	**$2.6**	**$17.8**
Addenda (2019)			
Accessories for Mechanical Insulation Systems	*5,069*	*$0.4*	*$0.8*
Laminated Metal Building Insulation	*2,972*	*$0.2*	*$0.5*
Structural Insulated Panels	*1,050*	*$0.1*	*$0.1*

***** 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 2020.

The manufacture of insulation materials directly generates $17.8 billion in industry shipments and directly employs more than 39,000 workers across 45 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 54,100 indirect jobs. Finally, the wages paid by insulation manufacturers and their suppliers support more than 58,800 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 152,000 jobs which generate payrolls of $10.0 billion.

In addition, the combined economic activity supported by insulation manufacturing contributes $1.7 billion to state and local governments and $2.7 billion in federal tax revenues.

[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.

Table 3 – Upstream Economic Impact of Insulation Manufacturing (2020)

	Employment	Payroll ($ billions)	Output ($ billions)
Direct Impact (Manufacturers)	39,006	$2.6	$17.8
Indirect Impact (Supply Chain)	54,126	$4.2	$20.6
Payroll-Induced Impact	58,797	$3.2	$12.2
Total Impact	**151,929**	**$10.0**	**$50.6**

Downstream Economic Impact

Looking downstream, more than 47,000 wholesalers distribute insulation products to contractors/ installers and retailers around the country and more than 464,000 workers are engaged in the drywall and insulation installation, nonresidential roofing, and mechanical insulation installation. Payrolls in those sectors amount to $3.5 billion and $29.8 billion, respectively. The paychecks from these workers help support families and local economies throughout the U.S.

Table 4 – Downstream Employment and Payrolls (2020)

	Employment	Payroll ($ billions)
Distribution/Wholesale		
Roofing, Siding, and Insulation Wholesalers	39,307	$2.9
Mechanical Insulation Distributors	8,037	$0.6
Total Distribution/Wholesale	**47,344**	**$3.5**
Installation/Contractors		
Drywall & Insulation Contractors	258,986	$14.8
Roofing Contractors - Nonresidential	107,686	$6.7
Mechanical Contractors	97,417	$8.3
Total Installation/Contractors	**464,089**	**$29.8**

CONCLUSION

The insulation industry, including manufacturers, distributors, and installers, makes 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, which helps fight climate change. 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 45 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 (2020)

Manufacturing		Distribution/Wholesale		Installation/Contractors	
Ohio	4,861	Texas	4,207	California	69,158
Texas	3,420	Florida	3,576	Texas	43,545
Georgia	3,265	California	2,933	Florida	34,998
California	2,312	New York	2,187	New York	26,525
Pennsylvania	2,105	Illinois	2,105	Washington	16,252
Indiana	1,996	Virginia	2,068	Illinois	15,122
Illinois	1,705	Pennsylvania	2,050	Ohio	14,502
Florida	1,622	North Carolina	1,809	Pennsylvania	13,955
North Carolina	1,204	Georgia	1,763	Arizona	12,190
Wisconsin	1,201	Wisconsin	1,756	North Carolina	12,112
Other States	15,315	Other States	22,125	Other States	205,731
Total	**39,006**	Total	**47,344**	**Total**	**464,089**
Top 10 as % of Total	61%	*Top 10 as % of Total*	52%	*Top 10 as % of Total*	56%

Appendix Table 2 – Insulation Employment by Industry Segment (2020)

	Manufacturing	Distribution/ Wholesaler	Installation/ Contractors		Manufacturing	Distribution/ Wholesaler	Installation/ Contractors
Alabama	570	342	4,879	Montana	64	291	1,244
Alaska	62	39	610	Nebraska	245	520	3,120
Arizona	949	636	12,190	Nevada	609	255	8,134
Arkansas	116	313	3,367	New Hampshire	-	173	1,985
California	2,312	2,933	69,158	New Jersey	502	1,355	8,501
Colorado	501	1,349	10,891	New Mexico	128	101	2,420
Connecticut	404	564	4,288	New York	918	2,187	26,525
Delaware	-	267	1,340	North Carolina	1,204	1,809	12,112
Dist. of Columbia	-	-	614	North Dakota	17	119	1,131
Florida	1,622	3,576	34,998	Ohio	4,861	1,615	14,502
Georgia	3,265	1,763	11,768	Oklahoma	640	437	4,773
Hawaii	64	157	2,188	Oregon	148	337	7,658
Idaho	280	225	2,793	Pennsylvania	2,105	2,050	13,955
Illinois	1,705	2,105	15,122	Rhode Island	-	132	1,473
Indiana	1,996	1,145	9,502	South Carolina	731	833	5,237
Iowa	208	878	5,305	South Dakota	73	148	1,180
Kansas	875	637	4,688	Tennessee	437	1,410	7,786
Kentucky	922	662	5,679	Texas	3,420	4,207	43,545
Louisiana	199	441	4,624	Utah	1,065	507	6,942
Maine	36	42	1,983	Vermont	-	36	808
Maryland	102	685	11,053	Virginia	372	2,068	10,854
Massachusetts	354	1,183	11,720	Washington	497	742	16,252
Michigan	967	1,492	10,025	West Virginia	868	136	1,114
Minnesota	145	793	8,804	Wisconsin	1,201	1,756	7,870
Mississippi	554	310	2,445	Wyoming	-	53	916
Missouri	695	1,524	8,390	**U.S.**	**39,006**	**46,580**	**464,089**

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. Survey results for some segments were updated in August 2021. 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), EPS Industry Alliance, Extruded Polystyrene Foam Association, Structural Insulated Panel Association (SIPA) 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 23831 – Drywall & insulation contractors (residential & nonresidential)

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.

DISCLAIMER

The American Chemistry Council (ACC) has made reasonable effort to ensure the information contained in this report is complete and accurate. However, ACC expressly disclaims any warranty or guaranty, whether express or implied, associated with this reference book or any of the data contained herein.

This report and the information contained herein are owned and protected by the ACC. Data published in this book are based on various sources as well as ACC estimates. ACC disclaims any liability associated with the accuracy or completeness of the information presented, or its suitability for any particular use. Users of this reference book are solely responsible for any consequences, including any liability that arises from such use.

ECONOMICS AND STATISTICS DEPARTMENT

The Economics & Statistics Department provides a full range of statistical and economic advice and services for ACC and its members and other partners. The group works to improve overall ACC advocacy impact by providing statistics on American Chemistry as well as preparing information about the economic value and contributions of American Chemistry to our economy and society. They function as an in-house consultant, providing survey, economic analysis and other statistical expertise, as well as monitoring business conditions and changing industry dynamics. The group also offers extensive industry knowledge, a network of leading academic organizations and think tanks, and a dedication to making analysis relevant and comprehensible to a wide audience. The primary author of this report is Martha Gilchrist Moore.

Dr. Thomas Kevin Swift
Chief Economist and Managing Director
202.249.6180
kevin_swift@americanchemistry.com

Martha Gilchrist Moore
Senior Director – Policy Analysis and Economics
202.249.6182
martha_moore@americanchemistry.com

Heather R. Rose-Glowacki
Director, Chemical & Industry Dynamics
202.249.6184
heather_rose@americanchemistry.com

Emily Sanchez
Director, Surveys & Statistics
202.249.6183
emily_sanchez@americanchemistry.com