



Center for the
Polyurethanes Industry

POLYURETHANES CONTRIBUTE TO SUSTAINABILITY



THE GLOBAL GOALS

Durability and Versatility Make Polyurethanes Essential to Achieving the UN SDGs

Polyurethanes are one of today's most versatile materials. Polyurethane manufacturers produce innovative, life-enhancing products and technologies that play a unique role in making the world a more sustainable place and can help solve some of our world's biggest challenges. By helping natural resources and materials last longer, polyurethanes play an important role in promoting sustainability, reducing waste, and achieving the United Nations 17 Sustainable Development Goals (SDGs).¹

The industry is putting the power of polyurethanes to work in order to unlock solutions to society's biggest challenges in a safe and sustainable way. Importantly, most polyurethane products and product components are durable and long-lasting – often lasting for the life of the product, without replacement. For example, rigid polyurethane used to insulate refrigerators last the lifetime of the refrigerator and flexible polyurethane in automotive seating lasts the life of the car. Here are just a few examples of how polyurethanes contribute to a sustainable economy:

¹ The Sustainable Development Goals are a collection of 17 global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs, set in 2015 by the United Nations General Assembly and intended to be achieved by the year 2030, are part of UN Resolution 70/1, the 2030 Agenda.

2 ZERO HUNGER



A SAFE, ADEQUATE FOOD SUPPLY

SDG 2 (ZERO HUNGER)

The Food and Agriculture Organization of the United Nations (FAO) estimates that each year, one-third of all food produced for human consumption in the world (around 1.3 billion tons) is lost or wasted. This includes 45% of all fruit and vegetables, 35% of fish and seafood, 30% of cereals, 20% of dairy products, and 20% of meat.² Polyurethanes help people around the world access a safe, adequate food supply to meet basic nutritional needs.

- Cold chain shipping, a method to transport climate-controlled products like fruits, vegetables, meats, and other perishables, relies upon polyurethane insulation, or rigid foam, to help keep these products at the right temperature and safe for consumption.
- The cold chain process not only reduces waste, prevents foodborne illness, and improves access to quality foods for the most vulnerable populations, it also reduces the world's carbon footprint.

2 <http://www.fao.org/3/i3347e/i3347e.pdf>



- The carbon footprint of food produced and not eaten is estimated to be 3.3 billion tons of CO₂ equivalent.³
- Decaying food generates methane, a potent greenhouse gas 28 to 36 times more effective than CO₂ at trapping heat in the atmosphere over a 100-year period.⁴
- Polyurethane foam is an important component in major appliances such as refrigerators and freezers used to store food. From containers to packaging, from trucks to warehouses, rigid foam keeps products at the right temperature from harvest or production to consumption.
- Over 800 million people suffer from hunger worldwide, making the need to yield more crops vital.⁵ In an emerging practice, polyurethane foam can be used in greenhouses to hold water and nutrients for the plant, while offering a maximum air/water ratio throughout its lifetime.



3 Id

4 Intergovernmental Panel on Climate Change (IPCC) assessment report (AR5) Last viewed on June 6, 2018 at <http://www.ipcc.ch/report/ar5/>

5 <https://www.wfp.org/zero-hunger>



LONGER, HEALTHIER LIVES

(SDG 3)

Ensuring healthy lives and promoting well-being is essential to sustainable development and building prosperous societies. The world needs access to essential health services, such as pharmaceuticals, to help stop the spread of deadly diseases. In addition, sleep plays a vital role in good health and well-being throughout your life. Getting enough quality sleep at the right times can help protect your mental and physical health, quality of life, and safety.⁶

- Polyurethane foam in major appliances is used to store pharmaceuticals and extend their shelf life, allowing for much-needed access to groundbreaking medicines and medical treatments around the world to help eradicate deadly diseases. Polyurethane foam used in appliance foam is key to ensuring medical professionals have access to lifesaving pharmaceuticals during global health crises.
- Polyurethane mattresses and sleeping pads are efficiently shipped and are available around the world. Polyurethane mattresses and sleeping pads improve sleeping conditions and provide a more sanitary sleeping environment.
- Short sleep duration can lead to many negative health outcomes, including increased



⁶ <https://www.nhlbi.nih.gov/health-topics/sleep-deprivation-and-deficiency>

mortality.⁷ A good night's sleep is critical for good health and avoiding negative impacts from sleep deprivation.⁸ Mattresses generally contain flexible polyurethane foam or are made almost entirely of polyurethane foam. Polyurethane foam is a great option for increasing comfort.

- Polyurethane foam mattresses are often recommended to decrease the likelihood of bed sores for those managing with prolonged illnesses.⁹
- The supportive properties of flexible polyurethane foam pillows may be beneficial in reducing neck pain compared to chiropractic treatment alone.¹⁰
- Polyurethanes can help protect occupants during passenger vehicle accidents. Lightweight plastic foams, such as polyurethane foam, can add strength to automotive body cavities and increase occupant safety in vehicles.¹¹ Additionally, polyurethane foam used to create headrests, which help prevent whiplash injuries during car accidents.¹²

7 <https://www.sciencedirect.com/science/article/abs/pii/S1389945716301381>

8 <https://certipur.us/7-eye-opening-stats-for-better-sleep-month/>

9 <http://ushospice.com/reduce-bedsore-memory-foam-mattresses/>

10 Soal, L. J., Bester, C. M., Shaw, B. S., & Yelverton, C. (2019). Changes in chronic neck pain following the introduction of a visco-elastic polyurethane foam pillow and/or chiropractic treatment. *Health SA Gesondheid (Online)*, 24, 1-6. Available at: <http://www.scielo.org.za/pdf/hsa/v24/36.pdf>

11 <https://www.automotiveplastics.com/wp-content/uploads/PlasticFoam.pdf>

12 <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812069>



7 AFFORDABLE AND
CLEAN ENERGY



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



11 SUSTAINABLE CITIES
AND COMMUNITIES



MODERN ENERGY & A HEALTHY CLIMATE

SDG 7 (AFFORDABLE AND CLEAN ENERGY)

SDG 9 (INDUSTRY, INNOVATION AND INFRASTRUCTURE)

SDG 11 (SUSTAINABLE CITIES AND COMMUNITIES)

More efficient buildings and lighter cars use less energy and reduce carbon emissions, helping to create a less carbon-dependent society and supporting the fight against climate change and ozone depletion. With its excellent strength-to-weight ratio, insulation properties, durability, and versatility, polyurethane is helping conserve natural resources and preserve the environment by reducing energy usage.

Polyurethane companies are constantly working to improve the environmental impact of their products. Manufacturers have addressed issues from global warming potential (GWP) to embodied carbon to by transitioning to low GWP foam blowing agents and reducing impacts from raw material extraction.



- The U.S. Environmental Protection Agency gave Polyisocyanurate Insulation Manufacturers Association the Stratospheric Ozone Protection Award for its members' early removal of CFCs from polyisocyanurate insulation and roofing, and later also the EPA's Climate Award for leadership in climate protection.
- Polyurethanes are used throughout cars instead of heavier materials. In addition to the foam that makes car seats comfortable, bumpers, interior "headline" ceiling sections, the car body, spoilers, doors, and windows all use polyurethanes. This significantly reduces the weight of the car, increasing fuel efficiency, insulation, and corrosion resistance.
 - Lighter cars with polyurethane components are more efficient and use less non-renewable resources and reduce carbon emissions.
 - Reducing a vehicle's weight by 10% can improve the fuel efficiency by 6% to 8%.¹³
- Gaps, holes, and air leaks in buildings can make energy bills unnecessarily high and let valuable resources go to waste. Spray polyurethane foam (SPF) offers a solution: it performs as both insulation and an air sealant, or air barrier, closing those nooks and crannies that let air escape and add dollars to monthly energy bills.
 - The U.S. Department of Energy estimates that 56% of the energy used in a home goes to heating and cooling.¹⁴

13 <https://www.energy.gov/articles/545-mpg-and-beyond-materials-lighten-load-fuel-economy>

14 <http://energy.gov/heating-and-cooling>





- As much as 40% of a building's energy is lost due to air infiltration.¹⁵ Sealing buildings with products like SPF can reduce energy usage up to 30%.¹⁶
- Polyurethanes also help homes and structures be stronger and have a longer, more sustainable lifespan. SPF helps "seal" the building not only to keep conditioned air inside the building, but also prevents corroding elements, such as snow, water, and dirt from impacting and deteriorating the structure. Sealing attics with SPF can help prevent embers from entering the attic during wildfire events, preventing further loss of property.¹⁷
 - The Federal Emergency Management Agency (FEMA), which responds to natural disasters, has classified SPF insulation as highly resistant to floodwater damage, saying, "These materials can survive wetting and drying and may be successfully cleaned after a flood to render them free of most harmful pollutants."¹⁸
 - An SPF roofing system can improve a building's strength with an effective lifespan that can exceed 30 years.¹⁹

15 https://www.energystar.gov/index.cfm?c=new_homes_features.hm_f_reduced_air_infiltration

16 <https://www.energy.gov/eere/why-energy-efficiency-upgrades>

17 <https://www.nachi.org/unvented-roof-assemblies.htm>

18 <http://www.fema.gov/media-library/assets/documents/2655>

19 <https://www.whysprayfoam.org/spray-foam/roofing-systems/>



- Applying closed-cell spray foam in the cavities of the walls increases durability of the wall system²⁰ because of the foam's ability to conform and adhere to the surface upon which it is sprayed. A wall with spray foam insulation has a higher racking strength, or ability to maintain its shape under duress, than a wall assembly without spray foam.²¹
- According to the American Council for an Energy-Efficient Economy (ACEEE), energy-efficient buildings allow residents to shelter in place longer and reduce annual energy spending and overall net emissions. Energy efficient buildings can help vulnerable populations avoid dangerous and occasionally life-threatening situations in which weather and economics present a dual threat.²²
- According to ACEEE, energy efficiency can improve indoor air quality and mitigate the impacts of climate change.²³

20 <http://www.buildingscience.com/documents/information-sheets/high-r-value-wall-assemblies/high-r-wall-08-spray-foam-wall-construction?topic=resources/high-r-value>

21 <http://www.cufca.ca/research/SPF%20Research%20Report-Racking%20Strength-Council%20of%20BC%20Forests.pdf>

22 Enhancing Community Resilience through Energy Efficiency (Ribiero et.al. 2015)

23 Id.

12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



SUSTAINABLE CONSUMPTION & PRODUCTION

SDG 12 (RESPONSIBLE CONSUMPTION AND PRODUCTION)

Polyurethanes play an essential role in products and technologies we use every day. Polyurethanes' unique qualities help make these products durable and long lasting.

Polyurethanes are a product of chemistry that must be produced and used in ways that protect human health and the environment. This is why many chemical manufacturers and suppliers to the polyurethanes industry participate in the Responsible Care® program, the chemical manufacturing industry's environmental, health, safety, and security performance initiative.



About the Polyurethanes Industry

The business of polyurethane is an \$86.6 billion enterprise and a key element of the U.S. economy. The industry directly employs nearly 270,000 Americans and operates in more than 1,000 locations across the United States. A major job creator in the United States, each job in the polyurethanes industry yields four more jobs indirectly.

