American Chemistry Council

CHEMISTRY CREATES AMERICA COMPETES™

AMERICA'S PLASTIC MAKERS℠
MAKING SUSTAINABLE CHANGE

REPORT

Chemistry and Automobiles

Executive Summary

Automobiles that are lighter weight, more fuel efficient and safer for occupants are made possible by plastics and other products of chemistry.

The North American automobile manufacturing industry is a significant end-use market for the chemical industry. In 2024, an estimated 15.5 million passenger automobiles and light-duty trucks were produced in the United States, Canada, and Mexico and, on average, each vehicle has over $4,400 in chemistry.

Compared to a decade ago, the average chemistry value per vehicle has grown by more than $1,200 (or 38%). This includes $709 in plastics and polymer composites, $717 in synthetic rubber and elastomers, $634 in semiconductors and other electronic chemicals, $331 in textiles, and $286 in fluids and lubricants, along with hundreds of dollars' worth of other products of chemistry.

The average weight of an automobile in 2024 was 4,419 pounds, up 48 pounds (1%) compared to 2023. Plastics and polymer composites account for nearly 10% (429 pounds) of the average weight, up 18% compared to a decade ago. Plastics are used in a variety of innovative ways to help make cars safer and more fuel efficient. Plastics can make vehicles lighter; help increase fuel efficiency and reduce carbon emissions; and help provide safety benefits like seatbelts and airbags.

Innovation in the automotive industry is driven by a combination of factors including technological advancements and changing consumer preferences. The landscape of the automotive industry is changing as hybrids and EVs become a larger share of the market, and as automobiles become increasingly focused on technology. Many of the innovations in how vehicles are designed, manufactured, and used—both the vehicles of today and those of the future—are made possible by chemistry.

According to America's Plastic Makers,℠ plastics and polymer composites make up 50% of the volume of our cars and trucks but only 10% of weight. These materials help Increase fuel efficiency, cut auto emissions, reduce our nation's energy use and saves money at the pump. Plus, safety advances made possible by plastics save countless lives and reduce injuries.

Introduction

Plastics and other products of chemistry are critical to today's automobile. This report presents a quantitative analysis of the weight and value of chemistry components in an average automobile assembled in North America (United States, Canada, and Mexico).

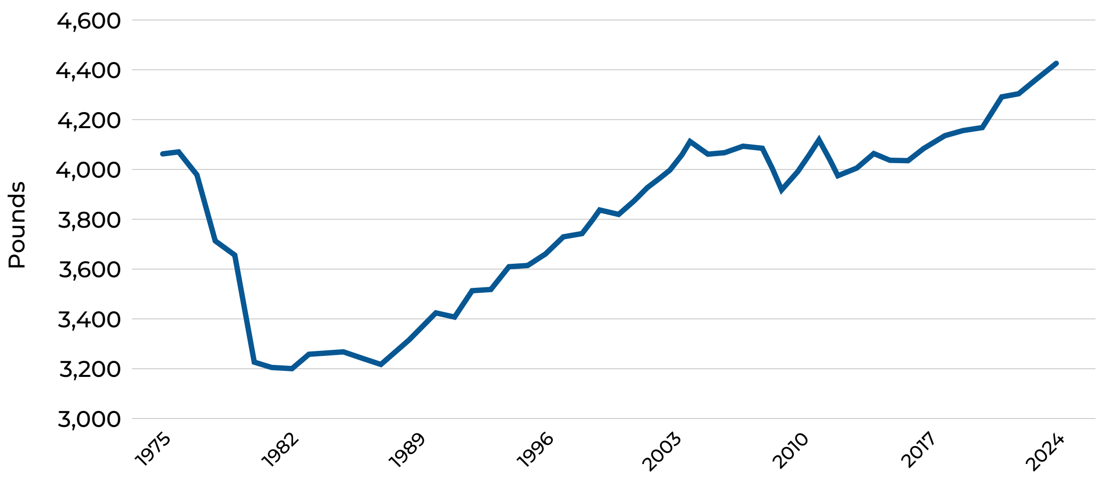
It should be noted, however, that the materials and components of individual vehicles vary widely. For the purposes of this report, the term "automobile" refers to a class of vehicles including passenger cars (e.g., sedans, wagons, small sport utility vehicles) and light trucks (e.g., pickups, minivans, larger sport utility vehicles). The term "vehicle" is used interchangeably with "automobile" except when otherwise delineated. Additionally, "production" is used interchangeably with "assembly." In general, the origin of production is based on the location of the vehicle's final assembly point, although individual components of a vehicle may be sourced from multiple locations.

TRENDS IN AUTOMOBILES

In 2024, the average weight of a North American-manufactured automobile rose by 48 pounds (or 1.1%) to 4,419 pounds – the highest since 1975.[1] In 1975, the average vehicle weighed 4,060 pounds, but by 1980 that figure had dropped by 20% driven by higher gas prices and the introduction of fuel economy efficiency and emissions standards. Vehicle weight averaged around 3,250 pounds through the 1980s and slowly started to increase, with an average weight of 3,600 pounds in the 1990s. Weight continued to inch up in the 2000s and, in 2004, the average vehicle weight surpassed 4,000 pounds for the first time since 1976. The average weight hovered around 4,000 pounds through the 2010s and has increased every year since 2017.

1 US Environmental Protection Agency. 2024 EPA Automotive Trends Report. Data available at www.epa.gov/automotive-trends/explore-automotive-trends-data. Accessed May 29, 2025.

Figure 1. Average Vehicle Weight



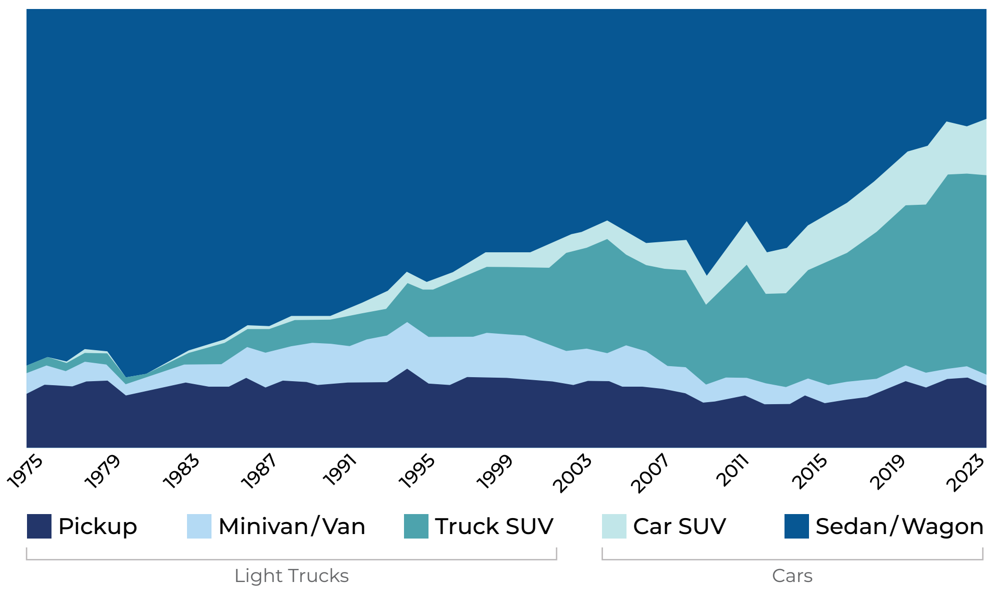
Source: EPA Automotive Trends Report

The rise and fall of average vehicle weights over time can be attributed to several factors such as consumer preferences, gasoline prices, and material composition. For example, the popularity of minivans, which can be 30% (or more) heavier than a sedan or small SUV— surged in the 1990s and accounted for an average of 10% of vehicle production between 1990 and 2000.

Although minivans did not maintain their market share, the average automobile weight continued to increase in the 2000s as light-duty trucks and SUVs became a larger share of the automotive market. In fact, light trucks have continued to increase market share over the past several decades and have held more than 50% of the market since 2018. In 2023 (latest available data), light trucks accounted for nearly two-thirds (62%) of vehicles produced in the U.S.

While larger vehicles tend to be heavier, materials used in a vehicle also play a key role in its overall weight. Over the years, lightweight materials, such as plastics and polymer composites, have replaced heavier materials, such as steel and other metals. All told, the fluctuations in average vehicle weight cannot be attributed to a single factor, but rather a multitude of elements reflecting the ever-changing dynamics in the automotive industry

.**Figure 2. Share of Production by Vehicle Type**



Source: EPA, ACC analysis

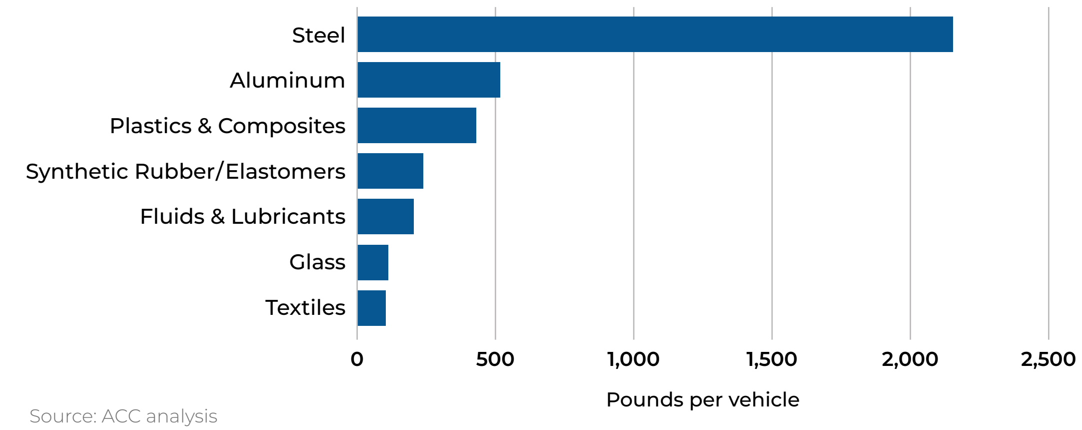
Automotive Chemistry

Motor vehicle manufacturing is an important end-use market for the chemical industry, with nearly every component of a modern automobile incorporating or relying on chemistry. In 2024, on average, every automobile manufactured for sale in North America contained $4,411 worth of chemical products and processing materials.

Compared to a decade ago, the average chemistry value per vehicle is up 38% (or $1,219). Chemistry is used in automobiles from the front bumper (which uses plastics such as polyethylene or polypropylene) to the taillight housing (which can be made with polycarbonate, acrylonitrile butadiene styrene (ABS), or polybutylene terephthalate). Chemistry is a key component of automotive exteriors, such as paints and coatings, windows and windshields, and door handles, as well as interior components like airbags, seatbelts, seating, and dashboards.

The rising value of chemistry in vehicles over the past decade (and in years prior) is partly due to the increased weight of vehicles on average, and the resulting increased weight of chemical components. But more significantly, it reflects the growing use of specialty chemicals and advanced plastics. As vehicles become more sophisticated, and as consumers look for more features, vehicle manufacturers have increasingly turned to chemistry to deliver performance, safety, and innovation.

Figure 3. Major Materials in an Automobile



Source: ACC analysis

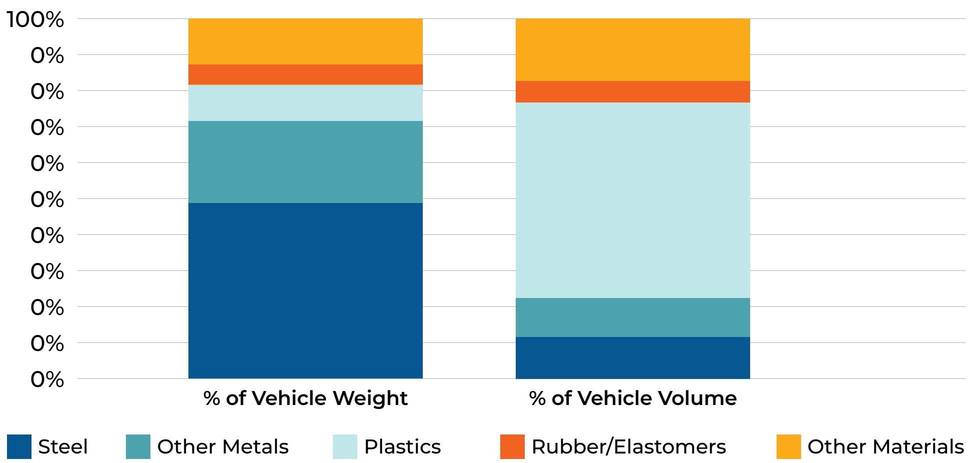
PLASTICS AND POLYMER COMPOSITES

Automotive Applications

Plastics and polymer composites are the largest (by weight) category of chemistry in an automobile. Lightweight plastics and polymer composites play a critical role in today's automobiles, as well as in the transition to next-generation vehicles, such as autonomous (self-driving) vehicles. Plastics and polymer composites enable vehicle weight reduction which can help automakers meet fuel economy standards, while enhancing safety for drivers, passengers, and pedestrians. .

According to ACC calculations, plastics account for over 50% of a vehicle's volume but less than 10% of its weight. Weight reduction in automotive design is a key driver in boosting fuel efficiency, reducing emissions, and lowering operating costs for motorists. The performance of vehicles has improved significantly over the years: according to EPA data the average horsepower (HP) of model 2023 vehicles reached a high of 272, compared to 230 just ten years ago and 210 HP two decades ago. Average fuel efficiency (real-world miles per gallon) reached 26.9 MPG in 2023, more than double the 1975 average. While advancements in engine and drivetrain technologies have contributed, so have innovations in chemistry and lightweight materials

Figure 4. Materials as Percent of Vehicle: Weight vs. Volume



Source: ACC analysis

The following are some examples of how plastics and polymer composites contribute to the safety, performance, and aesthetics of today's vehicles. For more detailed information on the uses and benefits of plastics and polymer composites in automobiles, visit http://www.plasticmakers.org/autos.

Automotive Exteriors – From bumper to bumper, plastics help keep the vehicle—and the passengers inside—safe. Materials such as thermoplastic olefins (TPOs), polycarbonates, polyesters, polypropylene, and polyurethanes are used in bumpers for their impact resistance and design flexibility. Reinforced plastic bumpers are engineered to absorb impact effectively. Composites in hoods improve aerodynamics and aesthetics, while plastic panels resist dents, corrosion, and UV damage—making them ideal for doors, hoods, and other exterior components.

Automotive Interiors – Modern interiors rely on polymers for components such as seats, dashboards, upholstery, sound insulation, and door panels. Instrument panels made from resins such as ABS, polycarbonates, and polypropylene allow for complex designs in items such as airbag housings, center stacks for instrument panels, and large, integrated instrument panel pieces. Consoles (e.g., armrests, cup holders, and storage spaces) would be difficult to reproduce as efficiently and with the same performance results using any family of materials other than plastics.

Design flexibility, corrosion resistance, and favorable mechanical properties make polymer composites a logical choice for upholstery and interior surfaces. Plastic car interior parts can provide similar aesthetics to natural materials with excellent scratch resistance for interior seats and surfaces. For example, many manufacturers are using artificial leather in automobiles owing to cost efficiency, aesthetic appeal, and other benefits. Recycled materials, including post-consumer plastics, are increasingly used in automotive textiles.

Safety – Many of the essential safety features in vehicles are made possible by chemistry and plastics. According to the National Highway Traffic Safety Administration (NHTSA), the use of seat belts (lap and shoulder belts)—which are typically made from polyester—reduces the risk of front seat passenger deaths by 45% in passenger cars. Air bags, which are commonly made from high-strength nylon fabric, are credited with saving 50,457 lives in the period from 1987 to 2017. Fiber-reinforced polymer composites can absorb four times the crush energy of steel while polypropylene and polyurethane foams and other polymer composites provide additional impact protection.

Windshields, Windows, and Sunroofs – Modern windshields are multi-layered, as the combination can be thinner, lighter, and stronger than tempered glass alone. The tear-resistant plastic layer helps both prevent occupant ejection while also preventing glass from shattering—and injuring passengers—during a crash. Plastics can provide glare prevention and UV protection, as well as sealing solutions for sunroofs and windows.

Lighting – Plastics can operate at high temperatures, making them desirable materials for exterior lighting such as headlights, fog lights, and taillights. Exterior lighting helps the driver see other vehicles and pedestrians, while also making the vehicle more visible to other vehicles. On the inside of the vehicle, plastic LEDs and acrylic fiber optic light tubes help make controls and instrument panels more readable. Plastics' use in safety door lighting helps alert oncoming cars of stopped roadside vehicles.

Chassis – The chassis is the primary framework of an automobile, forming a base for the entire vehicle. The chassis supports the other parts of a vehicle, as well as the passengers. While the primary material for the automotive frame is generally steel and/or aluminum, plastics such as polyamides are used to reinforce and improve the performance of metal frames, which is especially important in heavier vehicles, such as hybrid and electric vehicles.

Polyurethane bushings provide cushioning between various parts of the suspension system and aid in reduction of noise and vibrations.

Electrical – Today's vehicles rely on complex electrical systems, and plastics play a vital role in their performance. Strong, lightweight, and heat-resistant, plastic components have replaced heavier materials like copper in many applications. Acrylic fiber-optics are used for wiring; materials such as PVC and polyethylene are used as wire coverings and insulation.

Under the Hood – As under-the-hood conditions become more challenging, automakers and their suppliers increasingly rely on plastic car parts to help reduce weight and cost, increase parts integration, and provide for longer service life. In powertrains—complex systems of gears, shafts, and bearings—plastics help reduce the number of parts and improve efficiency.

In electric and hybrid vehicles, plastics offer a high strength-to-weight ratio and corrosion resistance. They are used in battery enclosures and other heat-sensitive components. Replacing metal components with plastics in EVs aids in weight reduction, reduces corrosion, provides design flexibility, and helps keep batteries safe during collisions -- and on average weigh 35% less than metal enclosures.

Weight of Plastics & Polymer Composites in Automobiles

The average automobile contains 429 pounds of plastics and polymer composites in 2024 (9.7% of a vehicle's total weight). This is up 19% compared to a decade ago. Over a dozen major resins find significant use in automobiles, including on average 100 pounds of polypropylene (PP), 87 pounds of polyurethane foam, 46 pounds of nylon, 33 pounds of polyethylene (primarily high-density polyethylene, or HDPE), and 33 pounds of polyvinyl chloride (PVC).

Table 1. Plastics & Polymer Composites in an Average Automobile (lbs./vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Polypropylene	84	85	88	91	93	93	97	97	100	100
Polyurethane Foam	76	76	76	78	80	81	82	84	85	87
Nylon	38	38	39	39	39	36	40	42	45	46
Polyethylene	27	28	29	31	31	32	33	33	32	33
Polyvinyl Chloride	27	27	28	29	30	30	31	32	33	33
Acrylonitrile Butadiene Styrene	22	22	24	22	21	21	21	21	24	24
Polycarbonate	17	17	18	18	18	19	19	20	22	23
Phenolic Resins	11	11	11	12	13	13	13	14	16	15
Polyvinyl Butyral	6	6	6	6	6	6	7	7	7	7
Polybutylene Terephthalate	5	5	5	5	5	5	6	6	5	5
Polymethyl Methacrylate	4	4	5	5	5	5	5	5	5	5
Polyacetal Resins	8	8	9	9	9	9	10	9	8	8
Other Plastics*	36	36	36	37	38	38	40	40	42	43
Total	**360**	**363**	**374**	**383**	**389**	**387**	**402**	**409**	**423**	**429**

*Other Plastics includes liquid crystal polymers, high-performance polyamides, polyphenylene ether, unsaturated polyester, and polyphenylene sulfide resins, among other small-volume plastics.

See *Data and Methodology* for data sources.

SYNTHETIC RUBBER AND ELASTOMERS IN AUTOMOBILES

The average automobile contains 233 pounds of synthetic rubber and elastomers, with an additional 75 pounds of natural rubber, in 2023. Thermoplastic olefins (or olefinic thermoplastic elastomers), such as thermoplastic polyolefins, accounted for 56 pounds of total vehicle weight, followed by styrene-butadiene rubber (SBR) at 49 pounds. Polybutadiene use averaged 27 pounds per vehicle and polyurethane elastomers accounted for 26 pounds. While tires account for the largest volume of rubber use in vehicles, synthetic rubber and elastomers are used in a wide range of applications, including seals and gaskets, weatherstripping, mats and flooring, and hoses, among others.

The use of synthetic rubber and elastomers has grown over the past decade, up 21%, while the weight of natural rubber in an average automobile has dropped by 7%. In general, synthetic rubber offers superior qualities compared to natural rubber, particularly in its temperature and abrasion resistance. Additionally, property-enhancing chemical additives can further improve the performance of synthetic rubber and elastomers. Tire manufacturers are also increasing their use of recycled rubber chemicals and synthetic rubber in new tire manufacturing.

Table 2. Synthetic Rubber/Elastomers in an Average Automobile (lbs./vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Thermoplastic Olefins	49	50	50	51	52	52	53	52	54	56
Styrene Butadiene Rubber	40	40	41	43	43	43	46	46	48	49
Polyurethane Elastomers	23	22	22	23	24	24	25	25	26	26
Polybutadiene	21	21	22	23	23	24	25	25	26	27
Ethylene-Propylene Elastomers	20	19	20	21	21	21	22	22	23	23
Butyl Rubber	12	12	13	13	14	15	16	16	16	17
Nitrile Elastomers	6	6	6	6	6	6	7	7	7	7
Other Synthetic Rubber	21	21	22	23	23	24	25	25	26	29
Total	**192**	**191**	**197**	**204**	**207**	**208**	**219**	**217**	**228**	**233**

See *Data and Methodology* for data sources.

OTHER KEY CHEMISTRY-BASED MATERIALS

In addition to plastics and synthetic rubber, numerous other products of chemistry are used in automobiles, both in the composition of the vehicle itself and in the manufacturing processes.

Fluids and Lubricants – The average vehicle contains 203 pounds of fluids such as lubricants, engine oil, transmission fluid, antifreeze, coolants, brake fluid, and windshield wiper fluids. These types of fluids contain chemistry, such as methanol in windshield wiper fluid, ethylene glycol in antifreeze, propylene glycol in engine coolants, and polyalphaolefins in synthetic lubricants. Automotive fluids often contain performance-enhancing chemical additives as well.

Glass – Today's automobiles contain an average of 110 pounds of glass, an increase of 22% over the past decade. The most common type is soda-lime glass, which is primarily comprised of three chemical compounds: silica, sodium carbonate (soda ash), and calcium carbonate. To enhance performance, automotive glass often incorporates polymer layers and chemical treatments that improve shatter resistance, clarity, and UV protection.[2] Today's vehicles contain more glass than ever before: not only do larger vehicles require larger windshields, side windows, and sunroofs, but the surface area of windshields continues to grow as drivers desire increased visibility. Additionally, glass can be used in dashboards and consoles, which increasingly include chemistry-enabled functionality such as touch screens.

Textiles – The use of textiles (e.g., synthetic fibers, nonwovens, composites) in the average automobile was 106 pounds in 2024, an increase of 20 pounds (22%) compared to 2015. The increase is partly attributable to shifting consumer preferences for luxury-like interiors. Textiles are used throughout automobiles; in addition to the visible uses such as upholstery, flooring, and seatbelts, textiles are used in door panels and as reinforcement for tires and belts, among other applications.

Coatings – The typical North American vehicle also uses an average of 44 pounds of coatings, which include primers, topcoats, and protective coatings for underbody components. A wide range of chemistries are used in automotive coating applications, including acrylic, melamine, polyurethanes, and thermosetting resins. As a percentage of total weight, coatings have declined slightly as coatings become thinner and application processes improve, thus reducing waste.

2 Automotive glass presents unique challenges for manufacturing and recycling (acs.org)

Table 3. Other Chemical Products in an Average Automobile (lbs./vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Textiles	81	81	86	89	91	94	99	102	105	106
Coatings	44	44	45	41	42	42	45	43	44	44
Glass	91	93	94	99	100	101	106	105	107	110
Fluids & Lubricants	198	194	188	190	183	187	195	198	201	203
Carbon Fiber	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5

See *Data and Methodology* for data sources.

METAL AND OTHER AUTOMOTIVE MATERIALS

For much of the 20th century, steel was the dominant material used in automobile chassis and body construction due to its strength and durability. However, steel is also dense, and as fuel efficiency became a growing concern in the late 1970s, automakers began replacing some steel components with lighter alternatives. Aluminum, which is up to three times lighter than steel, along with other materials such as magnesium, plastics, and polymer composites, have steadily gained market share, displacing heavier materials like iron and lead.

While steel still accounts for a significant portion of an automobile's weight, mild (low-carbon) steel has increasingly been replaced by lighter grades, such as high-strength steel and advanced high-strength steel (AHSS). In 2010, more than half of the steel in an automobile was mild steel, while high-strength steel and AHSS (combined) represented 39% of total steel. In 2024, an estimated 70% of an automobile's steel content was high-strength or AHSS, while mild steel accounted for less than one-third.

In addition to 2,130 pounds of steel, the average automobile contains 511 pounds of aluminum and 267 pounds of iron, as well as other metals such as zinc, copper and copper alloys, and magnesium. Although not quantified in this analysis, chemistry plays a vital role in the extraction, processing, and refinement of these metals, enabling their use in modern vehicle manufacturing.

Table 4. Metals Content in an Average Automobile (lbs./vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Mild Steel	828	774	737	709	665	633	631	590	543	537
High-Strength Steel	603	611	655	632	685	712	694	696	668	656
AHSS	509	530	532	585	564	554	694	759	821	841
Other Steels & Steel Alloys	118	122	123	101	101	79	84	63	106	96
Steel (Total)	**2,058**	**2,038**	**2,047**	**2,027**	**2,015**	**1,979**	**2,102**	**2,108**	**2,117**	**2,130**
Aluminum	397	411	426	438	449	459	480	501	506	511
Iron	314	312	315	313	313	307	268	267	267	267
Magnesium	14	20	27	31	31	33	36	37	42	42
Copper and Copper Alloys	37	37	38	38	39	41	44	51	54	55
Zinc	48	50	51	53	54	55	57	52	54	55
Lead	33	33	31	31	30	29	28	26	23	23
Platinum group metals	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Other metals/alloys	68	60	62	65	66	68	74	63	67	66
Metals/Alloys (Total)	**2,969**	**2,961**	**2,997**	**2,996**	**2,996**	**2,972**	**3,090**	**3,105**	**3,129**	**3,149**

See *Data and Methodology* for data sources.

Table 5. Materials Content as a Percent of Total Vehicle Weight

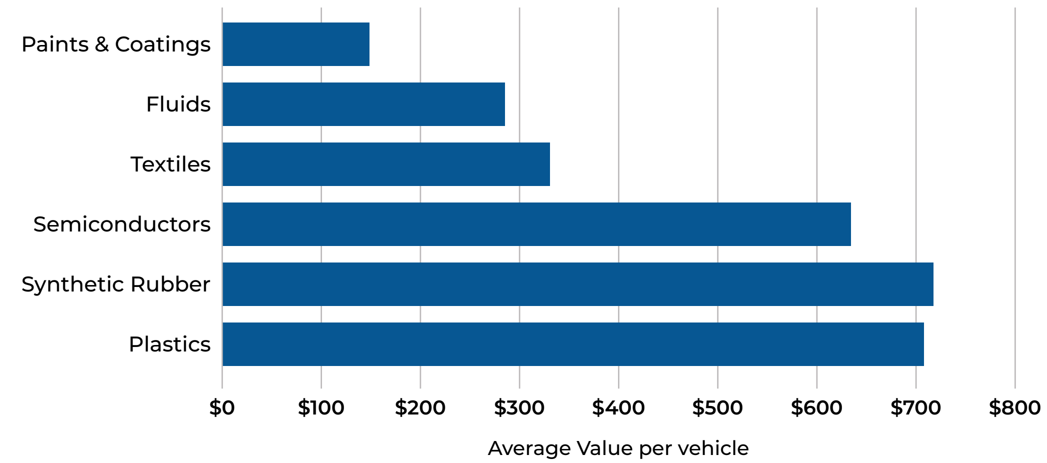
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Steel	51.0%	50.5%	50.0%	49.0%	48.5%	47.5%	49.0%	49.0%	48.4%	48.2%
Aluminum	9.8%	10.2%	10.4%	10.6%	10.8%	11.0%	11.2%	11.6%	11.6%	11.6%
Plastics & Composites	8.9%	9.0%	9.1%	9.3%	9.4%	9.3%	9.4%	9.4%	9.7%	9.7%
Iron	7.8%	7.7%	7.7%	7.6%	7.5%	7.4%	6.3%	6.2%	6.1%	6.1%
Other Metals/ Alloys	5.0%	4.9%	5.1%	5.3%	5.3%	5.4%	5.6%	5.3%	5.5%	5.5%
Synthetic Rubber/ Elastomers	4.8%	4.7%	4.8%	4.9%	5.0%	5.0%	5.1%	5.1%	5.2%	5.3%
Fluids & Lubricants	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%
Glass	2.3%	2.3%	2.3%	2.4%	2.4%	2.4%	2.4%	2.4%	2.3%	2.5%
Textiles	2.0%	2.0%	2.1%	2.2%	2.2%	2.3%	2.3%	2.4%	2.4%	2.4%
Natural rubber	2.0%	2.0%	2.0%	2.0%	2.0%	1.9%	1.9%	1.8%	1.7%	1.7%
Coatings	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

Note: Due to rounding, figures may not add to 100%.
See *Data and Methodology* for data sources.

The Value of Chemistry in Automobiles

Chemistry represents a substantial portion of a vehicle's overall value. The value of the chemistry content in an average automobile was $4,411 in 2024, up 38% (or $1,219) compared to a decade ago. The chemistry content includes $709 in plastics and polymer composites, $717 in synthetic rubber and elastomers, $634 in semiconductors and other electronic chemicals, $286 in fluids and lubricants, and $331 in textiles, along with hundreds of dollars' worth of other chemistry.

Figure 5. Average Value of Select Chemistries



Source: ACC analysis

Table 6. Value of Chemistry in an Average Automobile ($/vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Plastics & Composites	553	540	571	581	583	577	710	776	694	709
Synthetic Rubber/ Elastomers	551	522	554	570	550	535	652	679	675	717
Semiconductors & Electronic Chemicals	413	433	396	450	480	504	540	540	567	634
Textiles	219	214	221	235	237	229	275	311	329	331
Fluids & Lubricants	209	221	240	246	267	320	314	301	291	286
Automotive Catalysts	167	168	170	171	173	175	180	182	179	188

Table 6. Value of Chemistry in an Average Automobile ($/vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Adhesives & Sealants	102	103	108	111	114	115	136	155	179	180
Paints & Coatings	112	111	115	104	112	112	129	148	150	149
Plastics Compounding	71	75	83	85	103	108	110	130	127	130
Plastics Additives	74	69	73	83	80	72	98	107	95	92
Rubber Processing Chemicals	66	67	64	64	62	60	59	77	69	73
Processing and Other Chemicals*	655	693	738	780	828	862	941	972	996	922
Total Chemistry Value	**3,192**	**3,216**	**3,333**	**3,480**	**3,589**	**3,669**	**4,144**	**4,378**	**4,351**	**4,411**

*Processing chemicals, excluding rubber processing.
See *Data and Methodology* for data sources.

VALUE OF PLASTICS AND POLYMER COMPOSITES

In 2024, the value of plastics and polymer composites in an average automobile reached $709 per vehicle, representing a 28% increase over the past decade. This includes $94 of nylon, $73 of polyurethane foam, and $65 of polypropylene. While the overall value tends to correlate with the cumulative weight of these materials, pricing is also influenced by a range of external factors. These include fluctuations in feedstock availability, energy and labor costs, and currency exchange rates. As a result, year-over-year changes in the value of plastics and polymer composites do not always align directly with changes in material usage.

Table 7. Value of Plastics in an Average Automobile ($/vehicle)

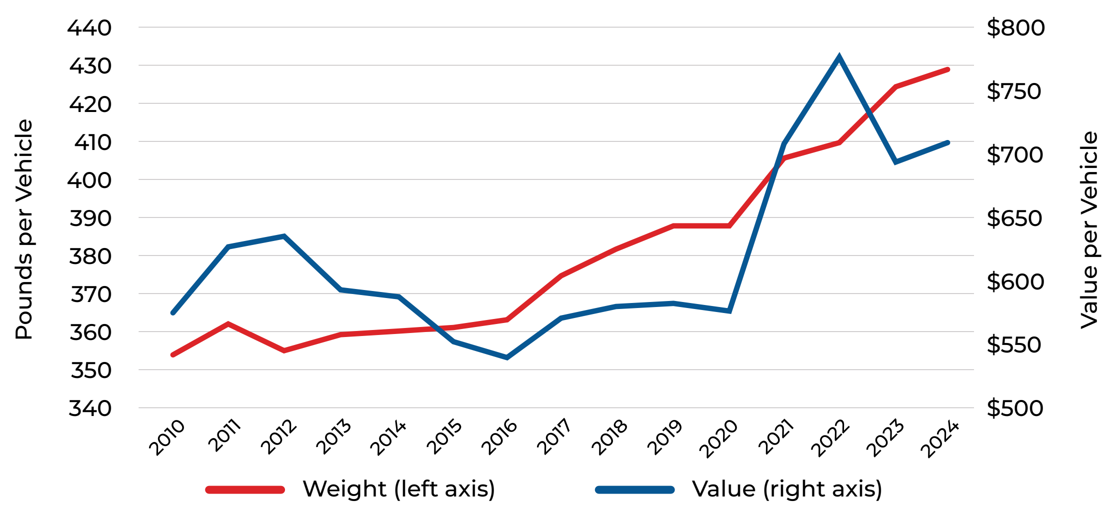
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nylon	52	48	54	65	68	58	61	79	91	94
Polyurethane Foam	60	58	59	67	68	63	67	80	74	73
Polypropylene	60	49	52	61	50	46	94	79	57	65
Polycarbonate	30	30	25	28	27	29	33	38	36	39
ABS Resins	14	14	20	19	14	15	12	27	24	24
PVC	18	19	18	20	21	21	40	36	24	23

Table 7. Value of Plastics in an Average Automobile ($/vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Polyethylene	18	19	22	26	25	17	27	27	21	20
Other Plastics/Polymers	301	305	320	296	310	328	375	410	367	371
Total Plastics & Polymer Composites	**553**	**540**	**571**	**581**	**583**	**577**	**710**	**776**	**694**	**709**

See *Data and Methodology* for data sources..

Figure 6. Weight and Value of Plastics per Vehicle



VALUE OF SYNTHETIC RUBBER AND ELASTOMERS

In 2024, the value of synthetic rubber and elastomers in an average automobile reached $717, including $144 for olefinic thermoplastic elastomers and $88 for polyurethane elastomers. These materials are essential for a wide range of automotive applications, from tires and seals to hoses, gaskets, and vibration-dampening components. Their growing value reflects both increased usage and desirable performance characteristics, such as enhanced resistance to heat and abrasion. Over the past decade, the weight of synthetic rubber in vehicles has increased by 21%, while natural rubber use has declined by 7%.

Table 8. Average Value of Synthetic Rubber/Elastomers ($/vehicle)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Thermoplastic Olefins	98	100	108	107	104	120	128	122	132	144
Polyurethane Elastomers	69	69	66	67	68	72	76	76	82	88
Styrene Butadiene Rubber	30	27	38	40	33	26	35	40	36	34
Ethylene-Propylene Elastomers	29	24	24	26	25	24	26	27	26	28
Polybutadiene	17	18	23	24	19	17	24	27	21	22
Butyl Rubber	19	13	11	17	17	15	13	17	19	18
Other Synthetic Rubber	13	11	17	17	15	12	16	19	17	19
Total Synthetic Rubber/Elastomers	**551**	**522**	**554**	**570**	**550**	**535**	**652**	**679**	**675**	**717**

See *Data and Methodology* for data sources.

OTHER PRODUCTS OF CHEMISTRY

The automotive industry is one of the largest end users of semiconductors and other electronic chemicals, which enable a wide range of safety and performance functions in automobiles. Features which were previously limited to luxury vehicles, such as advanced driver assistance systems (ADAS), navigation systems, adaptive cruise control, in-vehicle infotainment (IVI) systems, and keyless entry, are made possible by semiconductors and electronic chemicals. An average vehicle contained $634 in semiconductors and other electronic chemicals in 2024, up 54% compared to just ten years ago.

Adhesives and sealants play a large role in the manufacturing of automobiles, from bonding body panels to attaching trim to sealing windows and doors. Chemistries used in adhesives and sealants include polyurethanes, epoxies, and acrylics, among others. Carbon black is a major component of tires, but it is also used in other elastomers such as hoses, belts, and cables, as well as in paints and coatings

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PROCESSING CHEMICALS

Chemistry is a critical component to the processing of many of the materials that go into automobiles. While these products are often not present in the finished vehicle, they are integral to the production process. In addition to $73 in rubber processing chemicals, other processing chemicals contribute $630 to the value of chemistry in an average automobile. This includes industrial gases, which are used in applications such as welding, cutting, and testing vehicle components; metalworking fluids; water treatment chemicals; and textile chemicals, among others.

The Role of Chemistry in Automobiles of the Future

The automotive industry is undergoing a transformation driven by rapid technological advancements and evolving consumer expectations. As vehicles become more electrified, autonomous, and connected, chemistry plays an increasingly critical role—not only in how vehicles are built, but in how they function, interact, and adapt to future mobility needs. From advanced materials in structural components to digital integration, chemistry is enabling the next generation of automotive innovation.

TECHNOLOGY

Many features that were once exclusive to luxury automobiles—such as advanced driver assistance systems (ADAS), adaptive cruise control, in-vehicle infotainment (IVI), and keyless entry—are now standard in a growing number of vehicles. These technologies are made possible by semiconductors and electronic chemicals. Materials like polycarbonate and ABS are used in camera housings, while silicones protect sensitive electronics from heat, moisture, and corrosion. In electric vehicles, semiconductors are even more critical; according to the U.S.

International Trade Commission, hybrid vehicles can contain up to $1,000 worth of semiconductor content and according to Polar Semiconductor, newer EVs can have as many as 3,000 semiconductor chips compared to the 300-1,000 chips in today's average vehicle.[3,4]

ELECTRIC VEHICLES

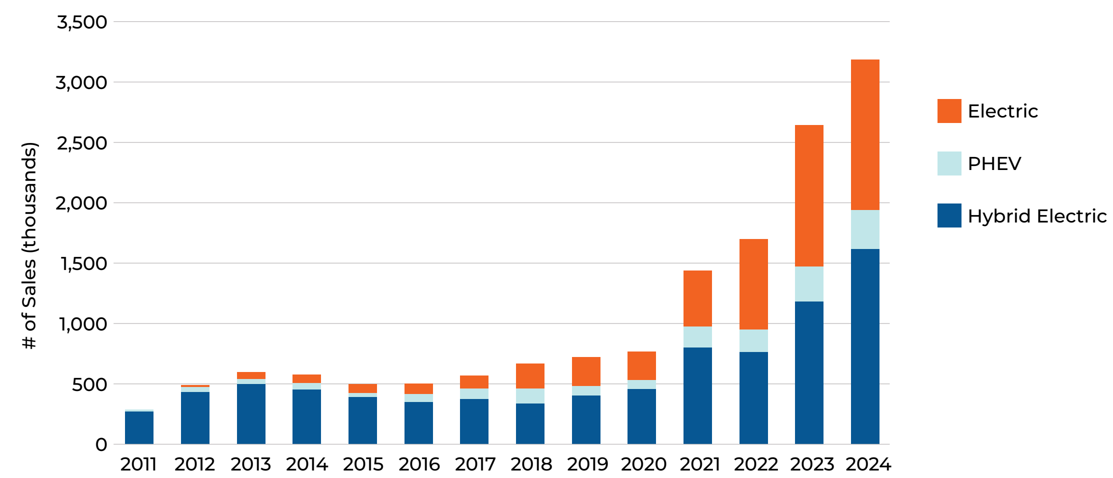
Since the launch of the Toyota Prius in 1997, the market for electric vehicles (including hybrids) has grown exponentially.[5] In 2024, over 3 million hybrid and electric vehicles were sold in the U.S., up from just 9,000 in 2000. As EVs and hybrids continue to gain market share, there will be an expanded need for many chemistries and plastics, including those that have only played a minor role in the manufacture of internal combustion engine (ICE) vehicles. Chemistry is essential to EV performance—from electrolytes and separators in batteries to lightweight structural components that offset battery mass. EV batteries contain hundreds—or thousands—of individual battery cells and can account for 25% (or more) of an EV's weight compared to less than 2% of an ICE vehicle's weight. Given their relatively lighter weight, plastics and polymer composites can help offset the battery weight in an EV. The desirable conductive properties of certain plastics and polymer composites make them sought-after materials for EV battery casings and enclosures. Carbon fiber, which is often blended with plastic resins such as PVC or epoxy to create carbon fiber reinforced polymers (CFRP), is five times stronger than steel but significantly lighter, making it a good material for structural components of EVs, such as chassis and body panels.

3 The Automotive Semiconductor Market: Key Determinants of U.S. Firm Competitiveness (usitc.gov)

4 https://polarsemi.com/blog/blog-semiconductor-chips-in-a-car/

5 https://global.toyota/en/prius20th/evolution/

Figure 7. Sales of Hybrid and Electric Vehicles



Source: Argonne National Laboratory, Light Duty Electric Drive Vehicles Monthly Sales Updates, available at https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates as of Mar. 6, 2025.

EV INFRASTRUCTURE

In addition to the chemistry and plastics used directly in electric and hybrid vehicles, chemistry is a key component of the associated infrastructure needed to keep electric vehicles (and plug-in hybrids) on the road. Components such as charger housings, display covers, connectors, and wiring rely on durable, weather-resistant plastics and polymers. Materials like polybutylene terephthalate (PBT) are used for their electrical insulation and moisture resistance, while polycarbonate is favored for transparent, impact-resistant display panels.

As use of EVs and hybrids continues to grow, the need for EV charging ports will also increase. National Renewable Energy Laboratory (NREL), in the report *The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure*, estimated there could be more than one million publicly accessible EV charging ports in the U.S. by 2030, which is six times the number of publicly accessible EV charging ports in 2023.[6] And as the need for EV charging ports increases, so will the chemicals and polymers used to make them.

6 https://www.nrel.gov/docs/fy23osti/85970.pdf

AUTONOMOUS VEHICLES

While fully autonomous vehicles have yet to become mainstream, many of today's vehicles include semi-autonomous features, such as lane-keeping systems and adaptive cruise control. These systems rely on a network of sensors, cameras, and processors—all of which depend on chemistry.

Lightweight plastic and composites will enable more flexible vehicle interiors and help offset the extra weight of self-driving vehicle sensors, cameras, and transmitters. Safety features such as airbags, seatbelts, pedestrian collision protection safety features, and padded dashes also benefit from advanced polymers. As technology in self-driving vehicles evolves, chemistry will continue to support innovations in connectivity, safety, and vehicle design.

Conclusion

The automotive industry's pursuit of lighter, more fuel-efficient, and safer vehicles is increasingly enabled by innovations in chemistry. In today's average automobile, plastics and polymer composites generally make up 50% or more of the volume but less than 10% of the weight, illustrating the critical role plastics have in lightweighting and performance enhancement. As electric and hybrid vehicles gain market share, and as all vehicles become more technology-focused, the importance of chemistry will only grow.

The chemistry value in an average automobile was over $4,400 in 2024, up 38% compared to a decade ago. With over 15.5 million passenger automobiles and light-duty trucks manufactured for sale in the United States, Canada, and Mexico, the chemistry value in the North American automobile market reached $68 billion in 2024.

Many of the innovations in how vehicles are designed, manufactured, and used—both the vehicles of today and those of the future—are made possible by products of chemistry. As the automotive industry continues to evolve, plastics and other products of chemistry will enable manufacturers to respond to advances in automotive technology and changing consumer preferences.

Data and Methodology

This report presents an analysis of the primary materials, particularly the products of chemistry, used in the manufacture of automobiles in North America (the United States, Canada, and Mexico). For the purposes of this analysis, the term "automobile" includes passenger automobiles and light-duty trucks. Since the size, components and features of automobiles vary significantly, this report presents estimated data based on an average automobile. This report includes revisions based on updated data.

Production volumes are based on data from United States Department of Transportation's National Transportation Statistics (NTS), the Canadian Vehicle Manufacturers' Association, and the National Institute of Statistics and Geography (INEGI) supplemented by data and information from the Alliance for Automotive Innovation, the International Organization of Motor Vehicle Manufacturers (OICA), and S&P Global.

Data on materials composition and weight were developed from a range of industry sources including ACC's Plastics Industry Producers Statistics Group, the Aluminum Association, the American Coatings Association, the American Iron and Steel Institute (AISI), Fortune Business Insights, Glass.com, the Association of the Nonwoven Fabrics Industry (INDA), the International Copper Association, the International Organization of Motor Vehicle Manufacturers (OICA), Kloeckner Metals Corporation, Lenntech Water Treatment, Markham Metals, S&P Global, the U.S. Department of Energy, the U.S. Geological Survey (USGS), and the U.S. Tire Manufacturer Association.

Data on the value of chemistry per vehicle were developed based on data and information from sources including ChemAnalyst, Federal Reserve Economic Data, FocusEconomics, NexantECA, S&P Global, the Semiconductor Industry Association (SIA), the U.S. Geological Survey (USGS), and the U.S. International Trade Commission (USITC), as well as various industry and trade publications.

The methodology used to develop weights and values for individual components varied based on the available data. In some instances, there was existing data (or range of data) on the weight and value of a given material in an average automobile. In other instances, data was only available for one aspect (weight or value) and then that data was used to develop the other data point, often using supplemental data. For some materials, only data for the given industry was available; in those instances, the industry level data was compared to the automotive industry data to develop a per-vehicle figure. The final data includes reasonable assumptions and estimates.

For many years, the American Chemistry Council (ACC) published an annual *Chemistry and Light Vehicles* report, built upon research on automotive high-tech materials initiated during the 1980s by Dr. TK Swift, who has since retired from ACC. The last *Chemistry and Light Vehicles* report was released in 2021. This report is not an update to the previously published reports; rather, it is a new analysis of the chemistry and other materials used in the manufacture of automobiles using updated data sources and methodology. As such, the tables and figures in this report are not comparable to data included in the *Chemistry and Light Vehicles* reports.

ACC's Economics & Data Analytics Department

The Economics & Data Analytics Department provides a full range of statistical and economic analysis and services for ACC and its members and other partners. The group works to improve ACC advocacy impact by providing statistics on the chemical industry as well as preparing information about the economic value and contributions of the chemical industry to the economy and society.

The lead author of this report was Heather Rose-Glowacki, Senior Director, Industry Intelligence & Analysis.

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The American Chemistry Council's Plastics Division represents America's Plastic Makers℠ and the hundreds of thousands of scientists, engineers and technicians who develop plastics essential to modern life. From healthcare and clean energy to transportation and safe food and water, plastics drive innovation and strengthen the U.S. economy by supporting key industries and creating well-paying jobs. Companies are investing billions annually in U.S. production and recycling, advancing manufacturing and efficiency across economic sectors. We envision a future where all plastic products are reused or recycled, conserving resources and creating a cleaner, safer and more resilient world.

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