



Economic Impacts of PFAS in Minnesota

- **PFAS (Per- and Polyfluoroalkyl Substances)** are chemicals used in a wide variety of health, safety, and consumer applications.
- **Numerous industries in Minnesota use PFAS as vital inputs**, whether as an important component of a final product itself or as part of its production process.
- **These industries help support economic activity in addition to what is reported in the official statistics.** This additional economic activity, known as indirect (upstream supply chain) and induced (spending of disposable income by employees) impacts, is estimated using input-output analysis and IMPLAN, a widely used economic modeling system.

Key PFAS-Utilizing Industries



Aerospace



Batteries



Refrigeration, Air Conditioning, and Heat Pumps



Automotive



Medicine and Pharmaceuticals



Semiconductors

*In total, the PFAS-utilizing industries analyzed helped support over **26,000 jobs** and contributed over **\$4.3 billion** to state GDP.*

Economic Impacts

	Employment	Labor Income	GDP
Direct	8.4k	\$995M	\$2,020M
Indirect	8.6k	\$871M	\$1,294M
Induced	9.3k	\$575M	\$994M
Total	26.4k	\$2,441M	\$4,307M

Employment Multiplier

Each job in a PFAS-utilizing industry helps support 2.1 other jobs in the economy.

Share of State GDP

PFAS-utilizing industries, their supply chains, and induced impacts account for 1.0% of state GDP.



Economic Impacts of PFAS in Minnesota: Industry Focus



Aerospace - Minnesota's aerospace industry use PFAS compounds for maintaining airworthiness and safety performance of aircraft. PFAS help to prevent degradation, corrosion, leakage, and contamination that can otherwise require high levels of maintenance or lead to failures.

In total, the aerospace industry supports nearly 1,900 jobs and contributes more than \$350 million to the state economy.

	Employment	Labor Income	GDP
Direct	905	\$90.2M	\$240.7M
Indirect	349	\$32.5M	\$47.0M
Induced	610	\$37.8M	\$65.3M
Total	1,865	\$160.6M	\$353.1M



Automotive - The automotive industry depends on PFAS compounds to manufacture engine components and in-car electronics. Additionally, PFAS are implemented in some types of automotive safety technology (including driver assistance systems).

Minnesota's automotive industry helps support over 4,600 jobs and contributes almost \$750 million to GDP.

	Employment	Labor Income	GDP
Direct	1,471	\$107.6M	\$330.4M
Indirect	1,814	\$165.4M	\$258.9M
Induced	1,359	\$84.1M	\$145.4M
Total	4,644	\$357.1M	\$734.7M



Batteries - PFAS compounds are used by manufacturers to produce a wide array of battery types due to their chemical, temperature, and oxidation resistance. The uses of batteries include a growing number of green energy applications, including solar energy storage and electric vehicle propulsion.

Battery manufacturers in Minnesota support nearly 120 jobs and roughly \$7.7 million in labor income.

	Employment	Labor Income	GDP
Direct	57	\$3.0M	-\$7.4M
Indirect	33	\$2.9M	\$4.4M
Induced	29	\$1.8M	\$3.1M
Total	119	\$7.7M	\$0.1M



Medicine and Pharmaceuticals - PFAS compounds are used as active ingredients and as a resource to achieve purity in the manufacturing and research stages. They are also used in medical packaging applications which preserve the shelf life of life-saving products.

In total, the medicine and pharmaceutical industry supports about 7,400 jobs and contributes nearly \$1.4 billion to the state economy.

	Employment	Labor Income	GDP
Direct	2,024	\$311.7M	\$666.4M
Indirect	2,481	\$265.3M	\$419.5M
Induced	2,880	\$178.2M	\$307.8M
Total	7,385	\$755.2M	\$1,393.7M



Refrigeration, Air Conditioning, and Heat Pumps - The refrigeration, air conditioning, and heat pump industry depends on PFAS for preserving perishable foods, protecting the pharmaceutical cold chain, and supporting air conditioning systems of vehicles, homes, and industries.

Minnesota's refrigeration, air conditioning, and heat pump manufacturers support over 5,000 jobs and contribute \$750 million to state GDP.

	Employment	Labor Income	GDP
Direct	2,175	\$207.0M	\$391.6M
Indirect	1,277	\$124.2M	\$184.4M
Induced	1,648	\$102.1M	\$176.3M
Total	5,100	\$433.3M	\$752.3M



Semiconductors - Minnesota's semiconductor industry depends on PFAS compounds to manufacture revolutionary technologies that underpin our digital society.

When indirect and induced impacts are included, activity related to semiconductor manufacturing supports over 7,000 jobs and contributes nearly \$1.1 billion to the state economy.

	Employment	Labor Income	GDP
Direct	1,813	\$275.3M	\$397.8M
Indirect	2,684	\$280.9M	\$379.5M
Induced	2,766	\$171.3M	\$296.0M
Total	7,263	\$727.5M	\$1,073.3M