

How Does Increased EV Production Affect U.S. Automotive Employment?

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Going forward, U.S. vehicle production will likely include more electric vehicles (EVs) and fewer vehicles with internal combustion-engines (ICEs). This may decrease the aggregate number of workers needed in the automotive supply chain, with decreases in engine and transmission manufacturing greater than increases in battery and electrical equipment manufacturing. Some of the jobs producing components for EVs may have more female workers than the ones producing ICEs, and thus this transition may increase the employment of women in the automotive workforce. This executive briefing examines how likely changes to the automotive supply chain could affect automotive employment, and possibly increase the share of female workers in that supply chain.

Introduction

With the transition of much of the U.S. vehicle market from internal combustion engine (ICE) vehicles to electric vehicles (EVs)¹, the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America (UAW), among others, have expressed concern about whether this will lead to a decrease in U.S. automotive employment. The International Energy Agency predicts that U.S. EV sales will increase from 231,000 in 2020 to 1.7 million in 2030.² The UAW published a white paper that examined the global automotive parts supply chain, which showed that the U.S. employment share is much higher in ICE engine and transmission production than in EV battery and electric motor production. They stated that U.S. EV parts production needs to increase as a share of global production to make up for the likely decline in employment in parts of the automotive supply chain related to ICE vehicles. Below is an overview of how the transition to EVs may affect parts of the automotive supply chain, and how these changes might affect the gender composition of automotive employment.

Likely Decrease in ICE Automotive Employment

With the transition from ICEs to EVs, it appears that fewer workers will be needed in the automotive supply chain. EVs are less complex than ICEs, with 80 percent fewer moving parts. Ford reported a 30 percent reduction in labor hours per unit for EVs compared to ICEs.³ At the end of 2021, 57,000 people were employed in motor vehicle engine manufacturing, having produced 8.5 million engines that year, meaning nearly 150 engines produced per person.

EV Production Will Generate Jobs in Battery and Electrical Component Production

The transition to EVs will likely lead to an increase in employment producing electric powertrains⁴ and advanced components such as batteries, electric motors, automotive electronics, and advanced braking systems. The key component in an electric vehicle is the battery, which makes up a significant share of the cost of an electric vehicle and will likely account for a large number of the jobs in the EV supply chain. Thus, where EV batteries are produced could have a significant effect on the mix of domestic and foreign content in U.S. electric vehicles. In recent years vehicle manufacturers have announced half a trillion dollars in EV-related investments. One prediction of global shares of lithium-ion battery manufacturing had North America making up 12 percent of global capacity in 2023, roughly 6 percentage points less than

¹ For purpose of this briefing, EVs are battery-electric vehicles with no internal combustion engine.

² Data selected were EV sales, cars, USA, STEPS scenario 2020-2030. Numbers do not include PHEV sales. IEA, [Global EV Data Explorer](#), (accessed January 24, 2022).

³ UAW Research Department, "[Taking the High Road](#)," January 2020, 13.

⁴ EV powertrains differ in that the engine is replaced with electric motors, the transmission is usually much simpler, and power comes from an electric battery.

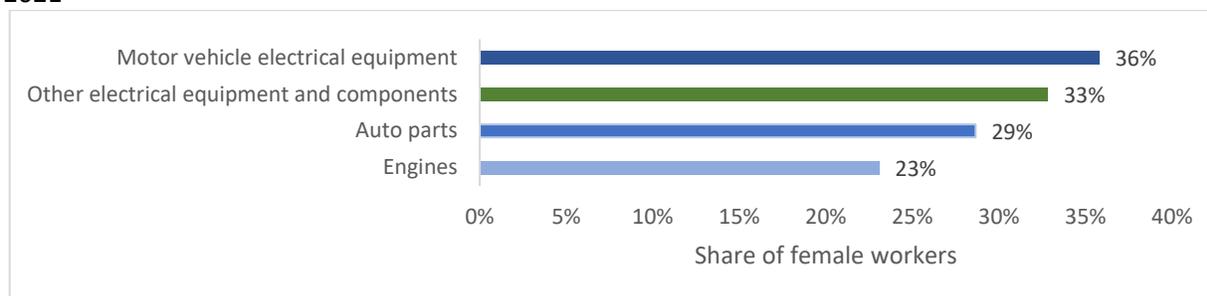
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North America's share of global vehicle production in 2019. However, since that estimate was released there have been several major announced investments in EV battery manufacturing, and for EV vehicles produced in North America to qualify for duty-free treatment under USMCA, they will need battery cells and packs produced in North America. Virtually all North American battery production is currently in the United States. While automotive battery manufacturing employment data is not available, one can attempt to extrapolate from individual plants. For example, GM's new Ultium plants are expected to employ 2,400 people, and have capacity to produce 350,000 200kwh batteries, for about 145 EV batteries per employee.⁵ This data point makes it seem possible that EV battery manufacturing would support a similar amount (50-60,000) of workers as motor vehicle engine manufacturing, though it may not make up for lost jobs in other parts of the supply chain. Without retraining, however, jobs in EV battery manufacturing may not be filled by those that previously produced engines or other ICE-related parts.

Increased female employment in the automotive industry?

As vehicle manufacturers produce more EVs and fewer ICEs, the types of jobs and the gender composition of jobs in the automotive industry may change. Women made up 27 percent of the nearly 992,000 workers in U.S. motor vehicle manufacturing in December 2021, while women make up 47 percent of the total workforce. One simple way of looking at the change that may occur is to compare the share of women producing ICEs to those producing motor vehicle electrical equipment. In December 2021, just 23 percent of workers producing ICEs in the United States were women (figure 1). Meanwhile 36 percent of the 58,000 workers producing motor vehicle electrical equipment were women, and 33 percent of the 142,000 workers producing other electrical equipment (non-automotive) were women.

Figure 1: Share of female employment in automotive and electrical equipment manufacturing, December 2021



Source: BLS, "Employment, Hours, and Earnings from the Current Employment Statistics survey (National)," (January 14, 2022). Note: NAICS codes used include, 3363 (automotive parts), 33631 (automotive engines), 33632 (motor vehicle electrical equipment, and 3359 (Other electrical equipment and components).

The ratio of men to women in these segments may not remain constant, and it is unclear why there is a greater share of women in electrical equipment manufacturing. Female workers may have a comparative advantage in certain roles within electric equipment manufacturing. However, it's also possible that the ratio of men to women within electrical equipment manufacturing will increase as male workers from other parts of the automotive supply chain, where employment declines, compete for those positions.

Sources: IEA, [Global EV Data Explorer](#), (accessed January 24, 2022); Ewing and Boudette, "[Why This Could Be a Critical Year](#)," February 8, 2022; UAW Research Department, "[Taking the High Road](#)," January 2020, 20; OICA, "[2019 Production](#)," accessed December 22, 2021; Perez, [Invisible Women](#), 2019, 105–06; Automotive World, "[Global Vehicle Engine](#)," May 27, 2021.

⁵ Author calculation based on the size of batteries in new GM EVs and announced employment and capacity.

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