#6: ZERO-EMISSION TRUCKS WORKFORCE TRANSITION & JOBS

Impacts and Options to Manage

UC Berkeley Center for Law, Energy & the Environment

Zero-Emission Trucks: A Factsheet Series

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ZERO-EMISSION VEHICLE GLOBAL TRANSITION HAS LED TO A SURGE IN GREEN JOBS

The rapid growth in global electric vehicle sales in general has created substantial new green jobs and laid the foundation for a continued future of overall job growth. While data on heavy-duty zero-emission vehicle job impacts is still scant, experts anticipate new jobs in the sector will offset any losses in the internal combustion engine vehicle and fossil fuel, as has happened in the light-duty sector. For example, in Europe, the European Climate Foundation forecasted a surge in employment in the light duty sector (as well as for more efficient internal combustion engine vehicles), with the estimated creation of 500,000 to 850,000 jobs by 2030. Furthermore, researchers project the transition overall to increase gross domestic product in the European Union by 1%. Future investments in complementary industries, such as charging, battery production and mining will have additional potential to create jobs. Finally, the transition could lead to an economic boost for vehicle owners and operators, due to reduced fuel and maintenance expenses, which they can then reinvest economy wide, leading to job growth in other sectors.

As the trucking industry invests in electrification, these economy-wide job impacts are likely to occur in this sector as well. As an example, a joint venture of major truck makers announced the building of a 21 gigawatt battery production factory in Mississippi that analysts expect will create more than 2,000 U.S. manufacturing jobs. In addition, a large U.S. manufacturer hired over 1,000 workers to increase semi-truck production in Nevada in early 2025.

The broader electric vehicle transition also necessitates a completely new and extensive infrastructure buildout for charging stations, and this deployment requires many new workers. The International Council on Clean Transportation estimated that growth in U.S. charging infrastructure could create roughly 160,000 jobs by 2032, with even greater job growth potential from increased domestic production and supply chain integration. They estimated that electric vehicle tax credits would enable such a growth in truck charging infrastructure.

As another example of how this transition is unfolding in ways that benefit overall job production, California has been a leader in the electric vehicle transition, with electric vehicles transition zero-emission vehicles comprising about 25% of light duty vehicle sales and approximately 16% of new medium- and heavy duty vehicle sales as of August 2024, which is supporting a nation leading number of zero emission manufacturing jobs. The UCLA Luskin Center for Innovation's Workforce Impacts of Achieving Carbon-Neutral Transportation in California (Sept. 2022) estimated that between 2020 and 2045, while the state may lose 730,000 full-time equivalent jobs in industries related to internal combustion engine vehicles and fossil fuels, it will simultaneously create over 7.3 million full-time equivalent job-years' worth of employment. This growth will result from the expansion of zero-emission vehicle-related industries, along with the deployment of charging and hydrogen fueling infrastructure.

On the infrastructure side, the California Energy Commission estimated that installing the required chargers to meet the state's zero-emission vehicle targets will generate up to 71,500 job-years, encompassing roles for electricians, general contractors, planners, and designers. This surge in demand will not only create thousands of skilled, well-paying jobs but also foster workforce training and development.

As another example, the Economic Survey 2023 estimated that by 2030, the zero-emission vehicle industry is expected to create 5 million direct jobs and 30 million indirect jobs. In addition, market research documented that between 2021 and 2023, the average employee count in the electric vehicle industry has risen by 110%. This shift necessitates significant skilling and reskilling efforts to equip the workforce for these advanced positions. This effort also includes ensuring that manufacturers support the transition in disadvantaged communities and build community-sustaining jobs.

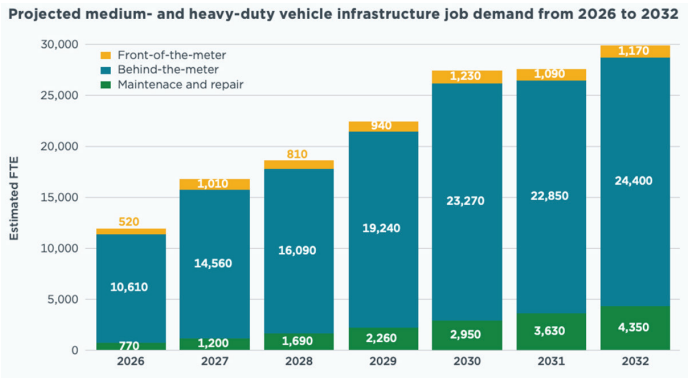

Figure 1: Estimated full-time equivalent jobs in the U.S. Source: ICCT, May 2025.

AFFECTED JOB SECTORS

Despite projected overall growth in jobs, the transition to zero-emission heavy duty vehicles will negatively impact specific sectors and require new digital advanced manufacturing and specialized skills. However, policy makers and industry leaders can offset some of the impacts via retraining or by allowing the current workforce to retire, along with decreased demand for internal combustion engine vehicles, without encouraging new entrants to these careers. For example, the advent of battery electric drivetrains in trucks will lead to declines in jobs related to traditional automotive manufacturing sectors, such an internal combustion engine repair, maintenance, exhaust and fuel system manufacturing, as well as their parts suppliers.

The transition could also impact sectors that produce components for both internal combustion engine and electric-heavy-duty vehicles, although these workers may more easily be able to transition with the new demand and diversify to other sectors. Some internal combustion engine manufacturing jobs have already been effectively transferred to the electric vehicle sector, including design, engineering, and assembly. Ultimately, workers involved in internal combustion engine manufacturing for heavy-duty vehicles could adapt to the technology changes through retraining. In fact, researchers at the University of Michigan found that the number of assembly jobs in production plants increased when plants transition to electric vehicles from internal combustion ones. Additionally, suppliers of steering and suspension and lighting systems, as well as other interior components will likely experience low or no employment impact given the commonality of components across electric and internal combustion engines. This dynamic is similar with tire or paint manufacturing.

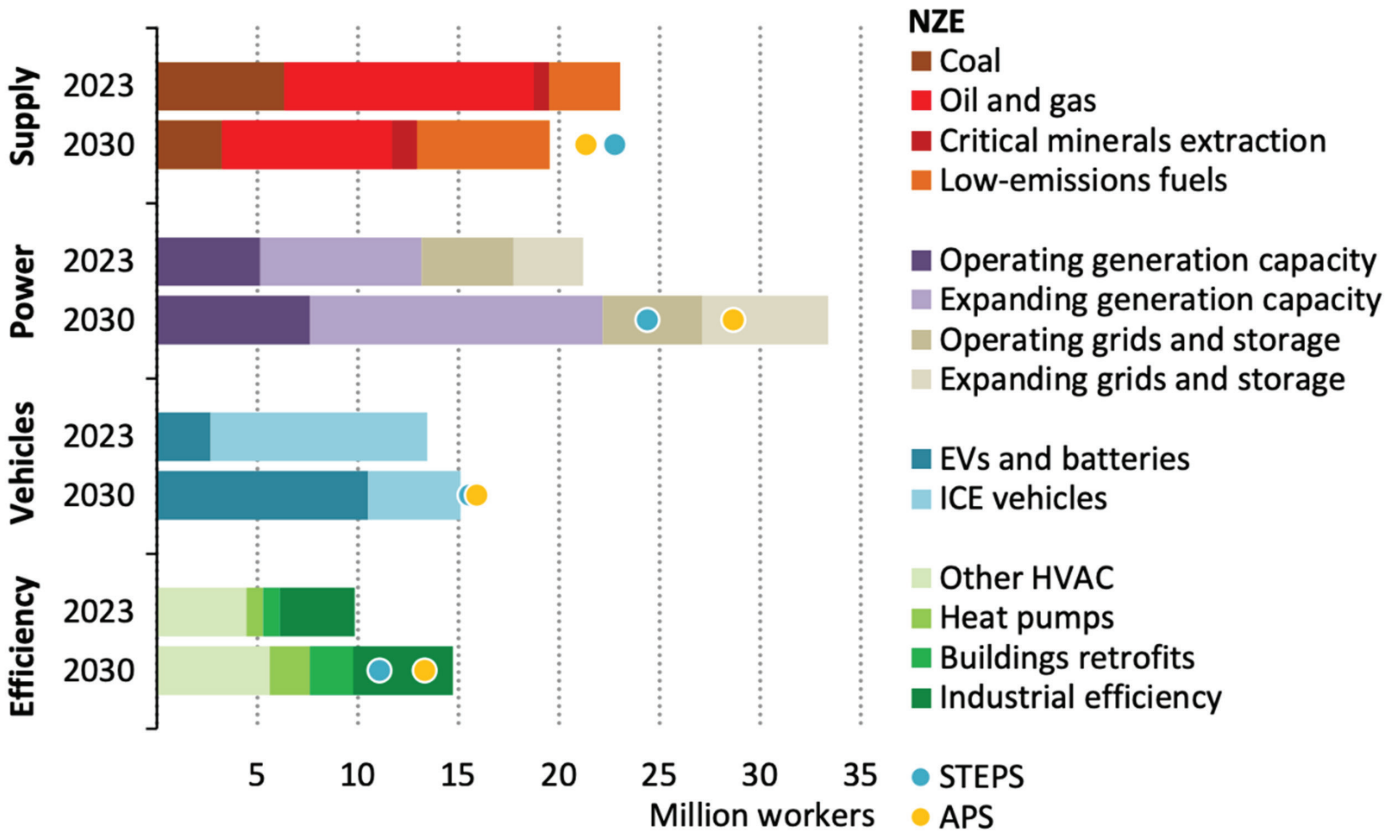

Figure 2: Source: IEA Energy employment by technology and scenario, 2023 and 2030; Stated Policies Scenario (STEPS): Announced Pledges Scenario (APS).

SUPPORTING WORKERS DURING THE TRANSITION

While the overall impact of the transition to zero-emission heavy-duty vehicles on jobs will likely be net positive, jobs related exclusively to internal combustion engines will decrease. Yet researchers have difficulty distinguishing between recent job changes due to the transition to zero-emission vehicles and those lost due to increasing automation of manufacturing, which is a separate and largely unrelated trend compared to the transition to zero-emission vehicles.

However, companies and governments can avoid many of these job losses if they provide retraining. For example, workers in internal combustion engine sectors often have skills that are similar to those needed in green sectors, making them competitive for other green jobs. Investment in worker education and training could therefore minimize the adverse employment impacts of the transition to zero-emission heavy-duty vehicles and potentially make the motor vehicle workforce more resilient to the transformation already underway.

For the commercial trucking sector, the UC Berkeley Labor Center recommended in 2020 that California policymakers prioritize subsidies and assistance for high-road trucking companies that classify drivers as employees, using responsible employer policies for public funding and contracts to protect workers and uphold labor standards. A high-road approach to economic development could optimize climate policy outcomes while supporting the creation of and access to family-supporting jobs. The Labor Center further recommended that workforce development funds should support high-road training partnerships that provide on-the-job training for drivers and retrain diesel mechanics for new clean vehicle technologies.

Several countries and regions have developed policies to help prepare motor vehicle workers for this transition by providing training programs:

- **European Union's Just Transition Fund**: This fund aims to support regions heavily reliant on traditional industries, such as automotive manufacturing, to transition to cleaner technologies like electric vehicles. It provides financial support for reskilling and upskilling programs for workers.
- **Japan's Green Growth Strategy**: The strategy outlines the creation of over ¥50 trillion in new environment-related markets and anticipates the generation of 1.4 million new green sector jobs. This initiative is part of a broader effort to reduce worldwide greenhouse gas emissions by leveraging Japanese private-sector technology.
- **The German Government** supports workers during the transition by investing in re-education and training initiatives. For instance, in 2022, the German Federal Employment Agency allocated €1.3 billion for training programs spanning various sectors including electric vehicles, with an additional budget of €1.7 billion allocated in 2023.

THESE ADDITIONAL REFORMS AND TRAININGS COULD HELP ENSURE A JUST TRANSITION:

Skill Development Trainings: Policymakers responsible for workforce development can identify specific employment needs and gaps within the zero-emission heavy-duty vehicle industry. They can then support and provide curriculum development and skill set trainings tailored to meet the specific needs of the industry. In addition, policymakers and stakeholders can partner with training providers and educational institutions to establish standardized certification programs for heavy-duty zero-emission vehicle production jobs. This approach could facilitate a smooth transition for current motor vehicle workforce while ensuring they remain competitive for the changing technology landscape.

Job Security and Economic Well-Being: Policymakers can offer financial support to temporarily displaced workers, particularly those in disadvantaged communities affected by the transition, providing a safety net as they pursue new employment opportunities within the zero-emission heavy-duty vehicle industry.

Long Term Planning: Policymakers can collaborate with educational institutions, training agencies, labor unions, and other stakeholders to align workforce development strategies with industry needs. In addition, they can conduct long-term strategic planning to anticipate future industry trends, helping to prepare the workforce for these upcoming changes.