

IMPLEMENTING THE INFLATION REDUCTION ACT: A ROADMAP FOR FEDERAL AND STATE TRANSPORTATION POLICY

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EXECUTIVE SUMMARY

The Inflation Reduction Act of 2022 (IRA) is the most significant climate legislation in United States history. Several independent studies find the IRA's \$370 billion in climate and clean energy investments could help cut U.S. greenhouse gas emissions roughly 40 percent by 2030. Combined with state action and forthcoming federal regulations, the IRA puts the U.S. within reach of its Paris Agreement commitment to cut emissions 50 to 52 percent by 2030.

Energy Innovation Policy and Technology LLC[®] prepared a series of research notes to detail the IRA's provisions across the electricity, building, and transportation sectors. The notes also describe how states and private actors can leverage the provisions to unlock economic, public health, and climate benefits, as well as how the U.S. can help bridge the gap to meet its 2030 climate goals.

This note covers the IRA's ground transportation sector provisions, which could jumpstart America's electric vehicle (EV) industry, create good-paying U.S. jobs, and get more zero-emission vehicles (ZEVs) on the road.ⁱ

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This report highlights the IRA’s most impactful policies, examines recent independent modeling investigating the IRA’s transportation sector impacts, and provides an implementation roadmap for state and federal policymakers. It explains how state policymakers can leverage the new law to reduce their state’s transportation sector pollution and attract new EV industries and jobs to their state. The report further demonstrates how federal policymakers can effectively implement the law, while adopting complementary policies to accelerate vehicle electrification this decade.

Top-line modeling results:

Our modeling evaluates a range of scenarios (Low, Moderate, and High) to determine the impacts of several IRA ground transportation incentives, compared to business as usual (BAU). This includes the new passenger EV tax credit (up to \$7,500) with new eligibility requirements for buyers and vehicles, the new commercial EV tax credit (30 percent up to \$7,500 for light- and medium-duty vehicles and up to \$40,000 for heavy-duty vehicles), EV charging incentives, and the battery production tax credit (PTC) of \$45 per kilowatt hour (KWh).ⁱⁱ

- In the Low Scenario, no vehicles qualify for the new passenger tax credit and none of the battery PTC benefit is passed through to consumers. The only incremental deployment is from the deployment of more chargers, and as a result there is almost no increase in EV deployment.ⁱⁱⁱ
- In the Moderate Scenario, 50 percent of new EVs satisfy requirements around sourcing of minerals and components from entities of concern (and a smaller share qualify for the full tax credit for the passenger tax credit) in 2032, and 12.5 percent of the battery PTC value is passed through, which when combined with the charger deployment increases the sales share of EVs—battery electric vehicles (BEVs) plus plug-in hybrid electric vehicles (PHEVs)—from 29 percent in 2030 to 34 percent, an increase of 5 percent relative to BAU. Our Moderate Scenario is reflected in the figures below.
- In our High Scenario, 100 percent of vehicles satisfy requirements around sourcing of minerals and components from entities of concern and other tax credit requirements for the passenger credit in 2032 and 25 percent of the battery PTC is passed through, along with increased charger deployment. This results in EV deployment reaching 39 percent in 2030, an increase of 10 percent relative to BAU.
- In all three scenarios, the tax credits significantly expand deployment of light- and medium-duty trucks, which receive the full credit since they are not subject to the same stringent eligibility requirements: EV light and medium truck sales increase from

ⁱⁱ The IRA includes other transportation provisions, described below, that are not modeled in the Energy Policy Simulator. For example, we do not model how the various domestic manufacturing funding programs will overlap and interact with the battery production tax credit nor do we model the impact of the used EV incentive.

ⁱⁱⁱ The IRA’s definition of clean vehicles includes PHEVs, BEVs, and fuel cell vehicles. In this research note, the term electric vehicles (EVs) refers to both PHEVs and BEVs, unless otherwise specified.

21 percent in BAU to 39 to 41 percent, and bus and heavy-duty truck EV sales also increase significantly, up from 15 percent to 20 to 21 percent for buses, and rising from 10 percent to 24 to 27 percent for heavy-duty trucks.

ES-Table 1. Sales Shares of BEV and PHEVs in 2030 by Scenario

Scenario	Passenger Vehicle BEV Sales Share	Passenger Vehicle PHEV Sales Share	Light/Medium Truck BEV Sales Share	Light/Medium Truck PHEV Sales Share	Bus BEV Sales Share	Heavy Truck BEV Sales Share
Business as Usual	21%	8%	17%	4%	15%	10%
Low	22%	8%	36%	3%	20%	24%
Moderate	25%	9%	37%	3%	21%	25%
High	29%	10%	38%	3%	21%	27%

ES-Table 2. Stock Shares of BEV and PHEV in 2030 by Scenario

Scenario	Passenger Vehicle BEV Stock Share	Passenger Vehicle PHEV Stock Share	Light/Medium Truck BEV Stock Share	Light/Medium Truck PHEV Stock Share	Bus BEV Stock Share	Heavy Truck BEV Stock Share
Business as Usual	9%	5%	7%	3%	5%	2%
Low	9%	4%	16%	3%	6%	5%
Moderate	10%	5%	16%	3%	6%	5%
High	11%	5%	16%	3%	6%	6%

Top-line research findings include:

- IRA’s transportation electrification incentives are important, but insufficient to cut transportation sector GHG emissions at the pace needed to align with the 1.5-degree Celsius scenario needed for a safe climate. More policy and regulatory actions are needed to accelerate transportation sector emissions reductions.
- Provisions in the IRA to boost domestic production of EVs and their supply-chain components will eventually enhance U.S. global competitiveness but will take time to build up a robust industry. Businesses and states should take advantage of new incentives and funding to quickly scale the domestic EV industry.
- Consumers, businesses, and the auto industry will need to adjust to meet more stringent eligibility requirements for passenger vehicle incentives, which are likely to limit near-term passenger EV adoption.

- Commercial EVs and fleets will get a boost from the new IRA incentives, which will expand the still-nascent medium- and heavy-duty EV market. Robust commercial tax credits for EV charging infrastructure (now up to \$100,000 per charger) will spur more private investments in DC fast charging to serve commercial vehicles and fleets.
- Used passenger EV incentives and the transferability of all incentives to the point of sale will help more consumers and businesses adopt EVs, especially lower- to middle-income individuals and households and small business owners. Requirements for the individual tax credit for EV charging will help expand EV charging access in currently underserved areas (such as more rural areas and lower-income communities).

Top-line policy recommendations include:

- **The U.S. Environmental Protection Agency (EPA) should swiftly develop and adopt more stringent tailpipe standards** that make EVs the most attractive compliance option for auto manufacturers and support domestic investments in mass production of EVs across all brands and vehicle classes.
- **States should continue adopting clean car and truck standards** to send a strong market signal that EVs are the transportation choice of the future. State leadership on clean transportation, including adoption of incentives for vehicles and infrastructure, will help cut emissions faster than just IRA incentives.
- **The U.S. Treasury Department’s guidance on passenger vehicle incentives should provide clear direction on the new eligibility requirements for consumers.** They should clarify how the value of the critical minerals provision will be determined, how the percentage of battery components and minerals will be documented, and how vehicle data will be obtained and shared publicly to support consumers and dealers. All relevant information should be accessible via the vehicle identification number (VIN), and the guidance should direct auto dealers and manufacturers to deploy a single coordinated approach to communicating this information to consumers in a simple way.
- **Policymakers and state transportation authorities should coordinate with fleet operators, truck drivers, gas station owners, and businesses** to make them aware of the commercial EV and charging tax credit and invite input on challenges to inform local strategies to increase commercial EV uptake.
- **States should consider adopting additional incentives and financing programs for commercial EVs and fast charging** that leverage the IRA tax credits and further reduce higher up-front costs of medium- and heavy-duty vehicles (especially for small business owners).
- **Policymakers at all levels of government should avoid or minimize the adverse impacts of manufacturing, mining, and processing facilities on communities and the environment.** All involved stakeholders should ensure that this industrial revolution is grounded in principles of environmental justice, equity, and environmental conservation.

- **Regulators and utilities should prioritize prudent investments in a reliable, clean, and resilient electric grid to support EV growth.** Electric utilities and regulators should also incorporate aggressive EV and charging forecasts into grid planning proceedings, rate design, interconnection standards, and demand management programs.

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IRA PROVISIONS WILL ACCELERATE CLEAN TRANSPORTATION DEPLOYMENT

Ground transportation makes up around 22 percent of total U.S. GHG emissions^{iv,1} and causes harmful air pollution that adversely impacts public health and air quality, especially in frontline communities that experience undue pollution burdens. Mitigating the transportation sector's impact on climate and public health will require swift policy and regulatory actions at the federal, state, and local levels in the next decade.

Modeling by Energy Innovation[®] shows that achieving net-zero emissions economy wide by 2050 will require *all new* passenger vehicles and medium- and heavy-duty vehicles be electrified (and powered by carbon-free electricity) no later than 2035 and 2045, respectively.² To support widespread EV adoption, the U.S. must swiftly build sufficient charging infrastructure to ensure a predictable driver experience while reducing range anxiety. To address broader global competitiveness objectives and national security interests, President Biden and Congress have made domestic production of EVs and their supply-chain components a top priority.

The IRA targets these objectives with a suite of incentives including tax credits for new passenger and commercial clean vehicles,^y tax credits for used clean vehicles, tax credits for charging or alternative fueling infrastructure, and grants and tax credits for domestic manufacturing and supply-chain components and critical minerals.

The Treasury Department, as it shapes guidance for these incentives by the end of the year, must specify how automakers can transparently define vehicle components and critical minerals to make the car-buying experience straightforward for consumers and auto dealers alike. If these processes are overly burdensome, they will further hinder passenger EV adoption.

According to Energy Innovation[®] modeling, the IRA's transportation electrification incentives, while important, are insufficient to cut transportation sector GHG emissions at the pace needed to align with a 1.5°C scenario for climate stability. Strong vehicle standards set by the EPA, along with expanded state adoption of state ZEV and clean-truck standards, remain imperative to achieve climate and pollution mitigation goals. Consumers, businesses, and the auto industry will also need to adjust to meet more stringent eligibility requirements for passenger vehicle incentives, which are likely to limit near-term EV adoption.

Despite the challenges associated with passenger vehicle incentives, commercial EVs will get a boost from the new IRA incentives, which will expand the still-nascent medium- and heavy-duty EV market. In addition, used passenger EV incentives and the transferability of all incentives at the point of sale will help more consumers and businesses adopt EVs. Infrastructure incentives will help build out the growing EV charging network in currently underserved areas (such as more rural areas and lower-income communities). And incentives for EV supply-chain manufacturing, mining,

^{iv} As of 2020, according to the EPA, on-road vehicles make up approximately 84 percent of the transportation sector's GHG emissions. The transportation sector as a whole is responsible for 27 percent of U.S. GHG emissions.

processing, and recycling will signal to automakers and suppliers that success in the U.S. hinges on their commitments to build new domestic facilities and source their materials and minerals from countries aligned with national security interests.

Developing the domestic EV and battery supply chain will create manufacturing jobs in the U.S. and support a stronger clean-vehicle market, more resilient to supply-chain disruptions. Nonetheless, policymakers and regulators at all levels of government will need to continue implementing equitable EV policies and regulations to accelerate the transition to clean, all-electric vehicles.

PERSONAL TAX CREDITS FOR CLEAN PASSENGER VEHICLES

The IRA extends for 10 years the \$7,500 tax credit (the 30D credit) for individuals and households that purchase a qualifying passenger BEV, PHEV, or fuel cell vehicle. It also lifts the 200,000-vehicle-per-manufacturer cap starting in 2023, which several EV manufacturers had reached when the IRA was enacted. Most significantly, the IRA changes eligibility requirements for vehicles and vehicle buyers based on four factors: where the vehicle is assembled; the origin of the critical minerals, battery, and battery components; the vehicle manufacturer's suggested retail price (MSRP); and the buyer's adjusted gross income (AGI).

- **Vehicle assembly:** As of August 16, 2022 (the day the IRA was signed into law), only passenger vehicles assembled in North America qualify for the \$7,500 federal EV tax incentive, leaving approximately 30 models eligible (out of approximately 100) in the U.S. (although 10 of those models have already met the manufacturers cap, rendering them ineligible for the incentive until the cap is lifted on January 1, 2023).³ Consumers and auto dealers can use a new U.S. Department of Transportation website to enter the VIN to determine where a vehicle was manufactured.⁴
- **Origin of EV materials and components.** Receipt of the full \$7,500 incentive is contingent on the vehicle meeting two new requirements (with each valued at \$3,750) that will phase in over the next few years:
 - **Critical minerals.** Starting January 1, 2023, critical minerals used in EV batteries (including lithium, nickel, and cobalt) must meet a gradually increasing percentage of the value^{vi} of the minerals extracted or processed in the U.S. or in countries that have free trade agreements with the U.S., or recycled in North America.⁵ The requirement starts at 40 percent in 2023 and increases by 10 percent each year, up to 80 percent at the start of 2027. Starting in 2025, a vehicle will not qualify for the tax credit if its battery's critical minerals are extracted, processed, or recycled by a "foreign entity of concern"—designated nations along with organizations

^{vi} The IRA does not provide further details on how the percentage of the value will be determined.

owned by, controlled by, or under the jurisdiction of such nations, as defined by the U.S. Secretary of State. That list notably includes China, where most critical minerals are processed today.

- **Batteries (and battery components).** Beginning January 1, 2023, batteries and their components must be manufactured or assembled in North America. The requirement starts at 50 percent in 2023, increases to 60 percent for 2024 and 2025, and then rises by 10 percent annually thereafter until reaching 100 percent at the start of 2029. Starting in 2024, vehicles will not qualify for any of the tax credit if the battery components were manufactured or assembled by a foreign entity of concern.
- **Entities of concern.** Of note, the language regarding entities of concern applies to the definition of the vehicle as a clean vehicle, so if a vehicle fails to meet this requirement (whether for critical minerals or batteries), it is automatically ineligible for the tax credit.

Eligibility Requirements for Passenger Electric Vehicle Incentive of \$7,500^a

		Critical Mineral Requirements					
Annual percentage of value of minerals extracted or processed in the U.S. or in countries with free trade agreements with the U.S., or recycled in North America	2023	2024	2025*	2026	2027	2028	2029+
	40%	50%	60%	70%	80%	80%	80%
		Battery Requirements					
Annual percentage of EV batteries and battery components manufactured in North America	2023	2024*	2025	2026	2027	2028	2029+
	50%	60%	60%	70%	80%	90%	100%

^a Eligibility for the incentive is contingent on the vehicle being assembled in North America as of August 16, 2022. Eligibility for the full incentive amount (\$7,500) is contingent on the vehicle meeting *both* the critical mineral requirements (worth \$3,750) *and* the battery component requirements (worth \$3,750). Vehicles that only meet one of these requirements can receive a \$3,750 tax credit. However, vehicles will be ineligible for the tax credit if they do not meet the “entities of concern” requirements (see below). Vehicles are also subject to MSRP caps and buyers are subject to AGI caps.

* Starting in 2025, vehicles will be ineligible for the tax credit if the battery’s critical minerals are extracted, processed, or recycled by a “foreign entity of concern.” Starting in 2024, vehicles will be ineligible for the tax credit if the battery components are manufactured or assembled by a “foreign entity of concern.”



Figure 1. Summary of critical mineral and battery component requirements for passenger EV incentive in the IRA

The Treasury Department will issue further guidance on these provisions by the end of 2022, which should provide more clarity around certain provisions for consumers, businesses, and auto manufacturers.

- **MSRP.** The incentive is only available for sedans with an MSRP of \$55,000 or less and for SUVs, pick-up trucks, and vans with an MSRP of \$80,000 or less.

- **AGI.** To ensure the tax credit is allocated to individuals or households that need an incentive to tip the scale on their buying decision, the incentive is only available to consumers with an annual AGI of \$150,000 for individuals, \$225,000 for head of household, or \$300,000 for a joint household.

These new requirements interact with, and influence the vehicle purchase decision-making process for consumers, as illustrated in Figure 2.

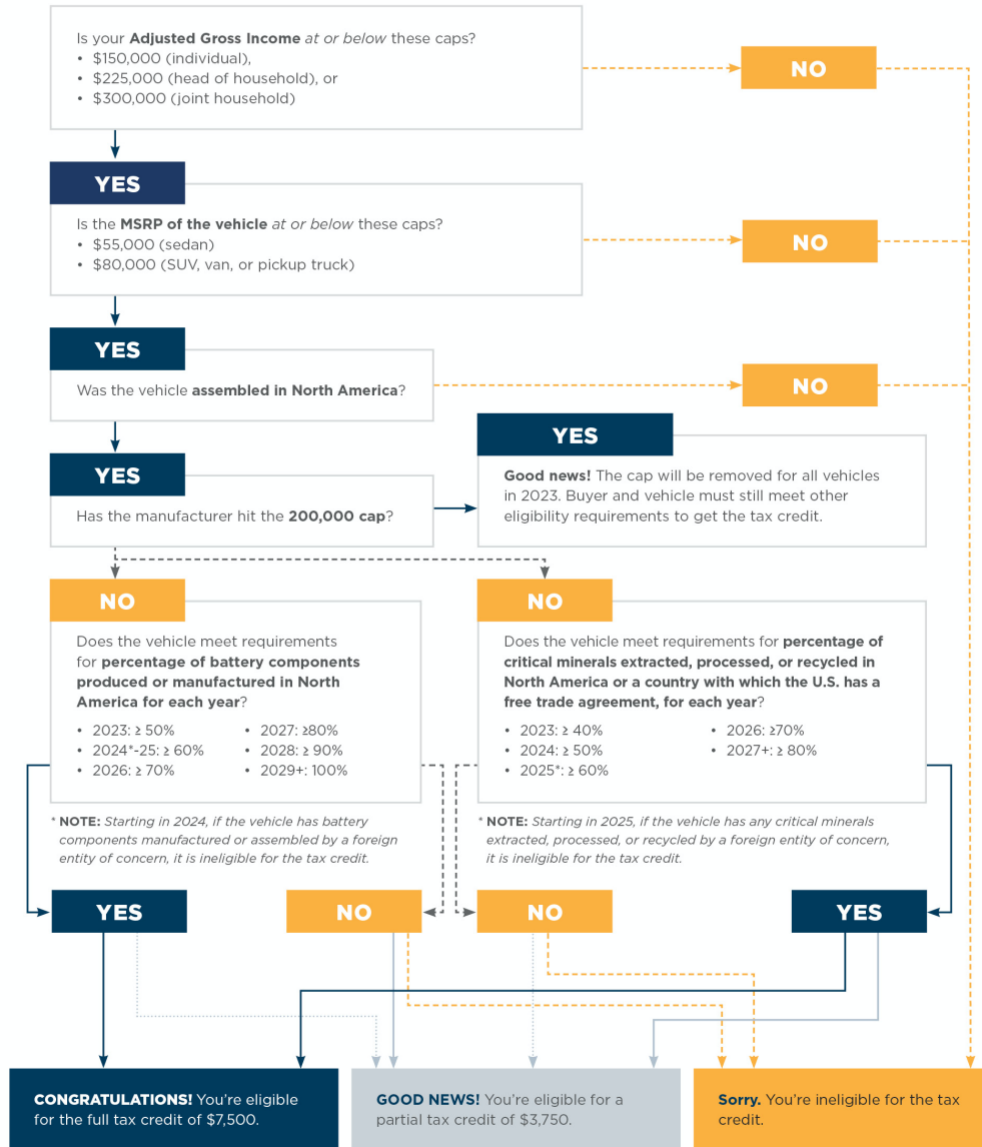
POINT-OF-SALE INCENTIVE

Starting in 2024, the IRA allows all eligible EV buyers to elect to transfer tax credits to an auto dealer at the time of purchase (in exchange for reducing the sales price of the vehicle). Known as a *point-of-sale incentive*, this change will help more people access EVs, since a vehicle's up-front price has a major impact on consumer buying decisions. Reducing the up-front purchase price reduces the down payment amount and monthly auto loan payments. Modeling by Energy Innovation® shows this new incentive feature will make most new EVs eligible for the full tax credit more affordable than gas cars right off the lot, especially benefiting lower- to middle-income individuals and households.⁶



I WANT TO BUY A NEW PASSENGER ELECTRIC VEHICLE.

Do I qualify for the full federal incentive of \$7,500?



■ This figure is for informational purposes only. Please inquire with the IRS for all tax-related questions or concerns.

Figure 2. Flow chart illustrating consumer decision-making based on eligibility requirements for the new passenger vehicle tax credit in IRA

PERSONAL TAX CREDIT FOR USED PASSENGER EVS

For the first time ever, the IRA provides a tax credit for used EVs equal to 30 percent of the sale price up to \$4,000 (it is available only to the first vehicle resale, and the final vehicle sale price must not exceed \$25,000 to qualify). Used vehicles make up more than a quarter of annual U.S. vehicle sales,⁷ and the IRA's used EV incentive will support more consumers in their preferences to buy used over new. A point-of-sale incentive option will be available for used EVs starting in 2024. In addition, the used EV incentive is not subject to any manufacturing, materials, or components requirements, though used EV buyers will be subject to the following caps on annual AGI: \$75,000 for individuals, \$112,500 for head of household, or \$150,000 for a joint household. The following flow chart illustrates the eligibility requirements. These caps will help more low- and moderate-income consumers benefit from the tax credit. And giving used EVs a new lease on life will reduce demand for new materials and components and yield considerable consumer savings.⁸

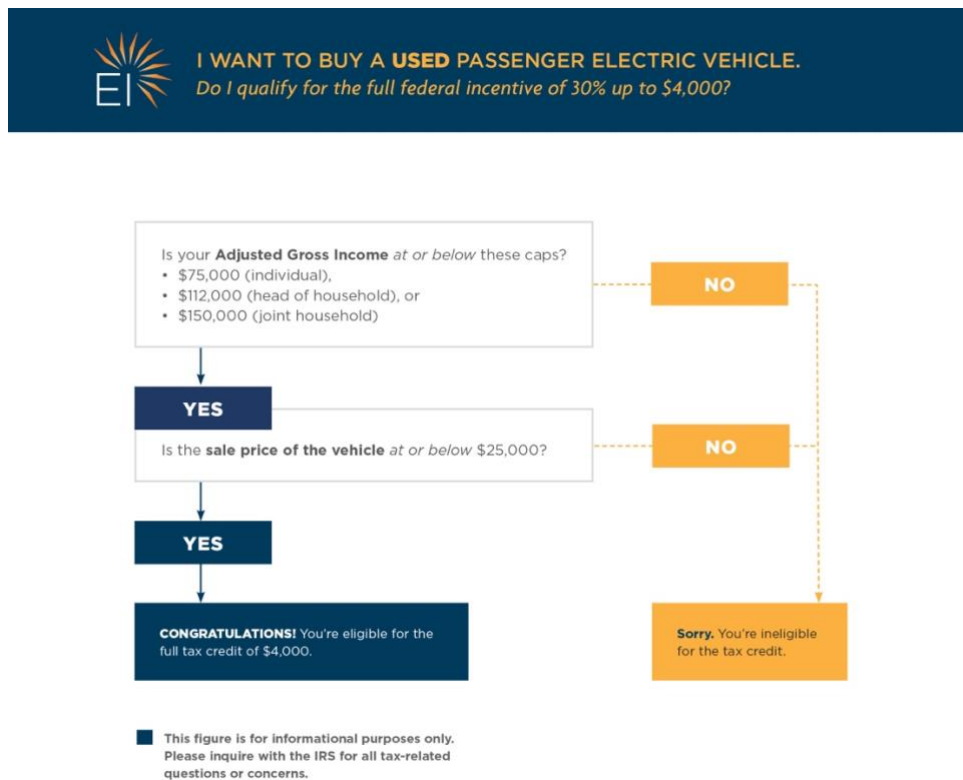


Figure 3. Flow chart illustrating the consumer decision-making based on eligibility requirements for the used passenger vehicle tax credit in IRA

COMMERCIAL EV TAX CREDITS

The IRA unlocks the market for fleet EVs by creating a new 30 percent commercial EV tax credit (up to \$7,500 for smaller vehicles weighing less than 14,000 pounds, and up to \$40,000 for vehicles weighing more than 14,000 pounds). This credit is equal to the lesser value of 1) the credit value, 2) the incremental cost of a clean vehicle compared to a standard combustion vehicle, or 3) 30 percent of the vehicle MSRP. With more than 8 million commercial vehicles and trucks used in fleets in the U.S. today,⁹ this incentive will help tip the scale for medium- and heavy-duty EVs.

DOMESTIC SUPPLY-CHAIN INCENTIVES

The IRA includes several new incentives to help the domestic EV auto industry swiftly ramp up to meet new requirements for critical minerals, batteries, and manufacturing:

- A new Advanced Manufacturing Production Tax Credit (45X) will be available for all qualified components for solar, wind energy, and batteries, as well as critical mineral production.¹⁰ The amount of the credit varies by technology, with battery packs eligible to receive \$45/kWh and critical minerals eligible for 10 percent of the costs incurred by the taxpayer associated with the production. This credit is also transferable, though it cannot be combined with 48C for the same facility. This tax credit would apply with respect to each “eligible component” that is produced by the taxpayer within the U.S. and sold by the taxpayer to an unrelated person during the taxable year. This production tax credit will help overcome cost barriers to doing business in the U.S. and encourage onshoring new EV and battery manufacturing facilities, as well as new critical mineral facilities.
- The extension of the Advanced Energy Project Tax Credit (48C) and allocation of an additional \$10 billion in tax credits will fund manufacturing or recycling clean-energy technologies and equipment, including EV and fuel cell vehicles and components, charging infrastructure, energy storage equipment and components, processing critical minerals, and other qualifying clean-energy technologies.¹¹ The credit is transferable, equal to 30 percent of project costs—subject to the U.S. Department of Energy’s (DOE) recommendations—and 40 percent of these credits are earmarked for facilities located in communities where coal mining or coal power plant closures have occurred in the past two decades.
- \$2 billion in competitive DOE grants for EV manufacturing, including conversion of manufacturing facilities for domestic production.
- \$500 million for enhanced use of the Defense Production Act (DPA), which President Biden invoked to direct the U.S. Department of Defense to use its DPA authorities to support domestic production of critical minerals three ways. First, feasibility studies for mature mining, beneficiation, and value-added processing projects. Second, by-product and co-product production at existing mining, mine waste reclamation, and other industrial

facilities. Third, mining, beneficiation, and value-added processing modernization to increase productivity, environmental sustainability, and workforce safety.

Several complementary programs exist in addition to the IRA resources, including several funded by the Infrastructure Investment and Jobs Act (IIJA):

- \$15.1 billion for DOE’s Loan Programs Office to support manufacturing eligible light-duty vehicles and qualifying components as part of its Advanced Technology Vehicles Manufacturing Loan Program.¹²
- \$45 million for DOE’s Advanced Research Projects Agency-Energy’s Electric Vehicles for American Low-Carbon Living (Evs4ALL) program to develop more efficient EV batteries.¹³
- \$3 billion for new DOE Battery Materials Processing Grants to make more batteries and components in America and bolster domestic supply of critical minerals.¹⁴
- A new DOE Office of Manufacturing and Supply Chains dedicated to successful implementation of these historic investments in America’s supply chain.¹⁵

These programs and incentives send a strong signal that the U.S. is serious about its commitment to build a homegrown EV and battery storage industry—one that creates good-paying jobs and supports responsible economic development in communities across the country. Onshoring EV and battery manufacturing will improve our global competitiveness, while also offering consumers more affordable EV models to choose from as the market grows.

CHARGING INFRASTRUCTURE TAX CREDIT

Alongside the IIJA’s \$7.5 billion to support building out a nationwide EV charging infrastructure network, the IRA also extends the 30C Alternative Fuel Refueling Infrastructure tax credit for private investments in qualified clean-vehicle infrastructure for 10 years:

- Individual credit of 30 percent of installed costs, up to \$1,000 per charger, provided the infrastructure is installed in a qualified census tract where the poverty rate is at least 20 percent, in a non-metropolitan area where median family income is \leq 80 percent of the statewide median family income, or a metropolitan area where median family income is \leq 80 percent of the statewide median family income or metropolitan area median family income.
- Commercial tax credit of 30 percent up to \$100,000 per charger (up from the prior \$30,000-per-location cap).

This tax credit for EV charging infrastructure will help support private investments in a more robust national network, and new eligibility requirements will help target EV charging access in underserved communities. Households, businesses, and commercial fleet operators can take advantage of this incentive to install EV charging infrastructure, enabling more people to charge EVs where they live and work.

MODELING IRA TAX CREDITS

As part of our research evaluating IRA emissions reductions, Energy Innovation® modeled the following provisions in IRA to determine their impact on sales of new EVs (BEV and PHEV) in the U.S.: the personal and commercial EV tax credits for new vehicles, the domestic battery manufacturing tax credits, and charging infrastructure tax credits. Our methodology and results are discussed below.

MODELING CONSUMER VEHICLE CHOICE

Our approach to modeling the tax credits is calculating an average credit value for covered vehicle classes in the model and using a logit allocation function¹⁶ to estimate the impact on new vehicle sales from the provisions. The Energy Policy Simulator (EPS), the in-house, open-source policy model that Energy Innovation® used for this analysis, tracks sales of new vehicles from the choice function, vehicle fleet turnover, vehicle stock, and associated energy consumption and emissions. The EPS does not include a representation of used vehicle sales.

The logit function allocates new vehicle shares based on the discounted total cost of ownership (TCO) of vehicles across different technologies. TCO includes purchase costs, fuel costs, maintenance costs, insurance costs, parking costs, licensing and registration costs, monetized market barriers like range anxiety, and tax credits and other incentives. Future annual costs are heavily discounted using a 15 percent discount rate based on real-world data.

The logit function allocates vehicles to different technologies based on the TCO for each vehicle type using the factors listed above. Shareweights are used to prevent the model from over-allocating to newer technologies. For BEVs, the shareweights are calibrated to match historical sales data in 2021 and scale to 100 percent by 2030. In other words, by 2030 100 percent of new vehicle sales could be met with BEVs if costs were low enough. Shareweights prevent the model from over-allocating technologies before the supply chains are in place; for example, if all BEVs were free next year, supply would be insufficient to meet 100 percent of U.S. demand. The shareweights help to grow the availability of vehicles in line with supply-chain scaling and to reflect limitations for early adoption of new technologies.

Tax credits affect the allocation by reducing the TCO for EVs. Charging infrastructure lowers the cost of the monetized market barriers, reducing the perceived TCO. The impact of charging infrastructure is modeled using data from the National Renewable Energy Laboratory and is based on the relative density of public chargers to gasoline pumps. The battery PTC is modeled as a reduction in vehicle cost, like a conventional tax credit. More information on our data sources and methodology is available at <https://us.energy policy. solutions/ docs> and in the model download available at the same link.

ESTIMATING THE VALUE OF THE NEW PERSONAL EV TAX CREDIT

To estimate the tax credit impact, we developed a weighted average tax credit value that combines all the different tax credit elements. First, we estimated the share of vehicles that could meet domestic battery assembly and critical minerals requirements, developing weighted average credit values for each. Then, we reduced the tax credit by the share of vehicles estimated to be under the MSRP cap. Finally, we limited the credit to the lesser of BEVs vehicles assembled in North America, qualifying consumers under the AGI cap, and estimates of the shares of vehicles that can meet the requirements for not sourcing materials from entities of concern.

DOMESTIC BATTERY ASSEMBLY CREDIT VALUE ESTIMATES

We estimated the share of EVs manufactured in North America that could use North American-made batteries by comparing the estimated North American battery manufacturing capacity to sales of U.S. light-duty vehicles and estimated battery demand. Our source for projected battery manufacturing capacity projects an additional 1,137 gigawatt-hours (GWh/year) of new manufacturing capacity by 2030,^{17,vii} and we added the existing 56 gigawatt-hours (GWh) of capacity for a total of 1,193 GWh/year by 2030.

Using data from the International Council on Clean Transportation (ICCT)¹⁸ and the U.S. Energy Information Administration's (EIA) Annual Energy Outlook¹⁹ we estimated the average battery size per newly sold vehicle, which resulted in 65.5 kilowatt-hours (kWh) per vehicle.

Comparing the total estimated battery manufacturing capacity and average battery size, we estimated future capacity could supply more than 18 million new light-duty EVs per year by 2030, which currently exceeds total U.S. sales of new light-duty vehicles²⁰ and new EV sales²¹ by a wide margin, i.e. a sales share of greater than 100 percent. Based on this assessment, we assigned the full tax credit value for the domestic battery assembly component, i.e., \$3,750.

The new tax credits are transferrable, as discussed above. We assumed a small reduction in the credit value to account for the transferability of tax credits of 5 percent, due to transaction costs, and reduce the credit value accordingly.

CRITICAL MINERAL CREDIT VALUE ESTIMATES

We estimated the share of vehicles qualifying for the critical minerals incentive by starting with estimates of the value of minerals contained in EV batteries using data from the U.S. Geological Survey (USGS) Mineral Yearbook²² and proprietary data on battery composition and market shares.

^{vii} Some of the facilities did not have online dates, but we assumed all facilities without dates would come online by 2030.

Using these data sources, we estimated the average weight of different minerals in EV batteries across new vehicle sales, and the relative cost share of each of the minerals. Using data from the USGS Mineral Yearbook, we then calculated the share of each mineral that is supplied domestically or by countries with which the U.S. has a free trade agreement. Finally, we estimated the weighted dollar value of qualifying minerals in U.S. batteries relative to the requirements of the tax credit, which drops to roughly 56 percent by 2030 as the critical minerals' provisions scale up. In other words, we estimate 56 percent of newly sold BEVs would meet the critical minerals requirement in 2032.

This value served as our lower bound, used in our Low Scenario. In our High Scenario, we assumed that the use of qualifying critical minerals could increase to meet 100 percent of the requirement of the tax credit by 2032. In our Moderate Scenario, we assumed that use of critical minerals could scale to close half the gap between our Low Scenario and fully meeting the requirement, resulting in roughly 78 percent of vehicles qualifying by 2032. Each of these values was then multiplied by the incentive value of \$3,750 to estimate an average credit value for a newly sold BEV.

As with the domestic battery tax credit, we assumed a small reduction of 5 percent for the transfer of tax credits to dealers and reduce the incentive by this amount.

ESTIMATING IMPACT OF NEW MSRP CAP

The new tax credits include an MSRP cap of \$55,000 for sedans and \$80,000 for SUVs, pickup trucks, and vans. To estimate the impact of the MSRP cap, we combined 2021 sales data by manufacturer from Argonne National Laboratory and MSRP of EVs from manufacturer websites to develop a sales-weighted share of vehicles that qualify.²³ For most manufacturers, either all or none of their available EV models were below the MSRP cap except for Tesla (i.e., we tended to find that either 100 percent or 0 percent of a given manufacturers EVs met the MSRP cap requirement). For Tesla, we used 2021 sales data by model to estimate the qualifying share.

Given data limitations, we were not able to separate out MSRP caps for different vehicle types, and our results are therefore conservative. Across all available manufacturers and models, the sales-weighted average share of all EVs that qualified for the incentive is 87 percent.

We applied this value to the total credit value to deflate the average incentive available to consumers.

ESTIMATING POTENTIAL U.S. EV MANUFACTURING CAPACITY

The new personal clean-vehicle tax credits require that final vehicle assembly happen in North America. Therefore, a key constraint on the eligibility of new vehicles is the share of those demanded that can be supplied by North American manufacturers.

To estimate future North American EV manufacturing capacity, we relied on a report from ICCT.²⁴ For 2025 North American production capacity, we added all U.S. capacity for existing full electric, full electric conversion, and new full electric, plus a third of partial electric, and 3 percent of the mostly internal combustion engine vehicle manufacturing plants, plus announced plants by 2025.

For 2030, we added announced 2030 commitments for the six main U.S. manufacturers and calculated the resulting production using the ICCT manufacturing capacity and additional Canadian plants. No data was available for Mexico, so no Mexican production facilities were included.

For 2025 and 2030, we also assume a production-to-capacity ratio of nearly 77 percent, based on available data and consultation with other experts. The final North American production estimates for 2025 and 2030 are 2.8 and 5.6 million BEVs, respectively. These values were used, along with the AGI cap discussed next, as an upper bound on the share of new vehicles that qualify for the incentive.

ESTIMATING IMPACT OF AGI CAP

The personal vehicle tax credits also include an AGI cap of \$150,000 for individuals, \$225,000 for head of household, or \$300,000 for a joint household. We estimated the impact of the AGI cap by taking Census Bureau data aggregated by the Center for Sustainable Energy on vehicle purchases by income bracket. We then adjusted this data to account for historical data from The Fuels Institute²⁵ showing comparatively higher incomes for EV purchasers. Using this approach, the IRA's AGI caps eliminate 32 percent of new EV buyers in 2023, shrinking to 23 percent by 2030.

ESTIMATING IMPACT OF THE ENTITIES OF CONCERN LIMITATION

Perhaps the most significant constraint on tax credits are the two sets of restrictions around the use of materials from entities of concern, which includes China. Starting in 2024, a vehicle that contains *any* battery components manufactured or assembled by a foreign entity of concern is *wholly disqualified from receiving any credit*. Likewise, starting in 2025, a vehicle that includes *any* minerals extracted, processed, or recycled by a foreign entity of concern will be *wholly disqualified from receiving any credit*.

Most mineral processing and battery component production for many of the key minerals used in EVs takes place in China.²⁶ However, as noted above, a significant amount of battery production capacity is planned for North America, and by 2030 and beyond it is likely that most, if not all, new EVs sold in the U.S. could use batteries made in North America. By contrast, very few mineral processing facilities are planned for North America, creating uncertainty around whether automakers can meet the requirements. These facilities can take three to four years to build, suggesting that it is highly unlikely the EV industry can fully replace materials sourced from entities of concern by 2030. BloombergNEF estimates that 30 to 50 percent of new EVs might qualify for the credit by 2032, while others estimate that no vehicles will be able to qualify.²⁷

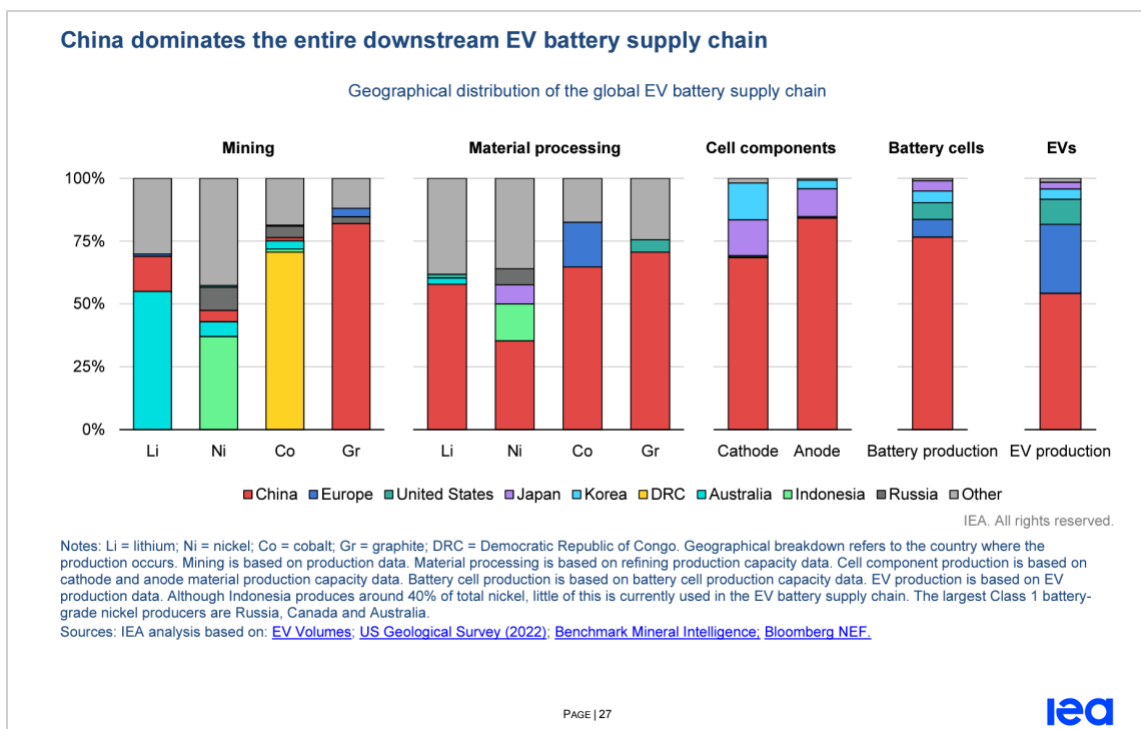


Figure 4. Summary of global EV battery supply-chain origins. Source: [International Energy Agency](#).

To account for the impact of the restrictions around entities of concern, we evaluated three potential pathways across our Low, Moderate, and High Scenarios. In our Low Scenario, we assume no vehicles will qualify for the credit. In our High Scenario, we assume that by 2032, 100 percent of vehicles could qualify. And in our Moderate Scenario, we assume 50 percent of vehicles could qualify, in line with the upper estimate from BloombergNEF.

PROJECTING FUTURE LIGHT-DUTY VEHICLE SALES

Future passenger car sales are estimated using historical data from the Bureau of Economic Analysis²⁸ and scaling by the growth rates of passenger sales from the EIA’s Annual Energy Outlook for 2022.²⁹ This results in roughly 13 to 14 million light-duty cars, SUVs, and pickup trucks sold per year between 2023 and 2030.

ESTIMATING THE WEIGHTED AVERAGE TAX CREDIT

Using each of the calculated pieces above, we then estimated a weighted average tax credit for new BEVs and PHEVs.

First, we combined the tax credit values, discounting for transferability and the MSRP cap, to find a net tax credit available. This value also accounts for state rebates and incentives by taking a state-sales-weighted average of rebates and incentives and applying these to the total federal and state tax credit value.

Then we determined the market coverage of new tax credits based on the market limitations created by the AGI cap, entities of concern rules, and North American assembly requirement. We take the minimum share of new vehicle purchases that meet these criteria and assign the first allocation shares to these vehicles. For the remaining vehicles, we used the second allocation without the tax credits.

The figures below show how we calculated the weighted average tax credit value:

$$\begin{aligned}
 & \textit{Weighted Average Tax Credit Value} \\
 & = \textit{Estimated Tax Credit Value} \\
 & * \textit{Share of LDV Sales Eligible for Tax Credits}
 \end{aligned}$$

Where:

$$\begin{aligned}
 & \textit{Share of LDV Sales Eligible for Tax Credits} \\
 & = \textit{MIN} \left[\begin{array}{l} \% \textit{ BEVs Meeting Entities of Concern Requirements,} \\ \% \textit{ BEV Purchasers Meeting AGI Requirements,} \\ \textit{North America BEV Assembly} \\ \textit{MIN} \left(\frac{\% \textit{ BEV Sales in Allocation} * \textit{Total LDV Demand}}{\% \textit{ BEV Sales in Allocation} * \textit{Total LDV Demand}}, 1 \right) \end{array} \right]
 \end{aligned}$$

The weighted average tax credit is fed into the EPS model as part of the allocation for new vehicles.

MODELING COMMERCIAL VEHICLE CHOICE

To model the commercial vehicle tax credit, we calculated the tax credit separately for light- and medium-duty trucks (freight LDVs), heavy-duty trucks (freight HDVs), and buses (passenger HDVs). For freight LDVs, we developed a weighted average credit value by multiplying by the shares of newly sold vehicles under and over 14,000 pounds, using EIA’s sales data on commercial trucks, light- and medium-duty trucks, which comprise our freight LDV category. Buses and freight HDVs were assumed to be over 14,000 pounds and qualified for the maximum credit of \$40,000. Based on estimates of incremental costs for electric trucks and buses to gasoline and diesel versions, all vehicles qualified for the full credit in every year between 2023 and 2030. We then fed the weighted average tax credit values into the logit allocations for new sales for each of the vehicle types.

MODELING EV CHARGER TAX CREDITS

In the EPS, EV charger investment reduces the shadow price of concerns around charger availability, which is part of the TCO calculation. The shadow price follows a logarithmic decline based on the relative density of charger stations to gas stations, based on data from Argonne National Laboratory.³⁰

The IRA provides a 30 percent tax credit for EV chargers under the Alternative Fuel Refueling Property Credit. To estimate the total chargers deployed with this incentive, we combined estimated outlays from the Joint Committee on Taxation with data on charger costs, assuming that 80 percent of funding would go to public chargers and that the funding represented 30 percent of the charger costs. We also applied a tax credit transferability reduction of 5 to 10 percent, depending on scenario. This approach resulted in estimated incremental deployment of 101,000 to 106,000 chargers by 2031. Based on our methodology, this reduced the estimated shadow cost for passenger cars and trucks by 9.2 to 9.5 percent across our scenarios by 2031, or around \$390 per vehicle.

MODELING BATTERY PRODUCTION TAX CREDITS (48X)

The IRA also includes a battery production tax credit of \$45/kWh for battery packs. Some of the value of this credit may be passed onto consumers through lower battery prices and lower vehicle MSRPs. To estimate the potential impact on BEV adoption, we started by estimating the battery pack size for different vehicle types, including BEVs and PHEVs for light- and heavy-duty passenger and freight vehicles, i.e., all on-road vehicles. We then multiplied the credit value by the size of each vehicle battery to estimate the average potential credit by vehicle type.

The potential credit was discounted heavily to reflect values that might be passed through to purchasers for a few reasons. First, the credit is only available for U.S.-manufactured batteries. While our research on battery production capacity discussed earlier suggests there will be sufficient U.S. production capacity to supply all light-duty vehicles, it is not a guarantee, especially for vehicles other than passenger cars where the tax credit is not contingent on North American batteries. It is likely that some share of batteries will continue to be imported.

More importantly, based on conversations with other experts, a likely scenario is that the value of the battery PTC is used to buy down the cost differential between producing the batteries domestically and sourcing them internationally. To put it another way, a plausible outcome is that the battery PTC causes many more batteries to be produced in the U.S., but the after-tax credit price is roughly the same as imported batteries. We did not model other provisions of the IRA focused on growing U.S. battery manufacturing and bringing down costs, though it is possible those could have the effect of further reducing battery pack prices.

Based on these findings, we assume that 0 percent, 12.5 percent, and 25 percent of the battery PTC is passed through to vehicle buyers, in our Low, Moderate, and High scenarios, respectively.

These cost reductions are then fed into the logit allocation along with the other pieces to estimate changes in BEV and PHEV adoption.

MODELING RESULTS

The combination of the tax credits modeled using the methodologies discussed above leads to increases in the sales shares of BEV and PHEV on-road vehicles. The tables below present our findings:

Table 1. Sales Shares of BEV and PHEVs in 2030 by Scenario

Scenario	Passenger Vehicle BEV Sales Share	Passenger Vehicle PHEV Sales Share	Light/Medium Truck BEV Sales Share	Light/Medium Truck PHEV Sales Share	Bus BEV Sales Share	Heavy Truck BEV Sales Share
Business as Usual	21%	8%	17%	4%	15%	10%
Low	22%	8%	36%	3%	20%	24%
Moderate	25%	9%	37%	3%	21%	25%
High	29%	10%	38%	3%	21%	27%

Table 2. Stock Shares of BEV and PHEV in 2030 by Scenario

Scenario	Passenger Vehicle BEV Stock	Passenger Vehicle PHEV Stock Share	Light/Medium Truck BEV Stock Share	Light/Medium Truck PHEV Stock Share	Bus BEV Stock Share	Heavy Truck BEV Stock Share
Business as Usual	9%	5%	7%	3%	5%	2%
Low	9%	4%	16%	3%	6%	5%
Moderate	10%	5%	16%	3%	6%	5%
High	11%	5%	16%	3%	6%	6%

In our BAU scenario, which included the earlier iteration of the EV tax credit, passenger vehicle EV (BEV + PHEV) sales reach 29 percent in 2030.

In the Low Scenario, no vehicles qualify for the new tax credit and none of the battery PTC benefit is passed through to consumers. The only incremental deployment is from the deployment of more chargers, and as a result there is almost no increase in EV deployment.

In the Moderate Scenario, 50 percent of new EVs qualify for the tax credit values in 2032 as calculated, and 12.5 percent of the battery PTC value is passed through, which when combined with charger deployment increases the sales share of EVs (BEV + PHEV) from 29 percent in 2030 to

34 percent, an increase of 5 percent relative to BAU. Our Moderate Scenario is reflected in the graphs below.

In our High Scenario, 100 percent of vehicles qualify for the credit in 2032, 25 percent of the battery PTC is passed through, and there is increased charger deployment. This results in increased EV deployment up to 39 percent in 2030, an increase of 10 percent relative to BAU.

EV Sales of Cars, SUVs, Pickups, and Buses (BAU vs. IRA, Moderate Scenario)

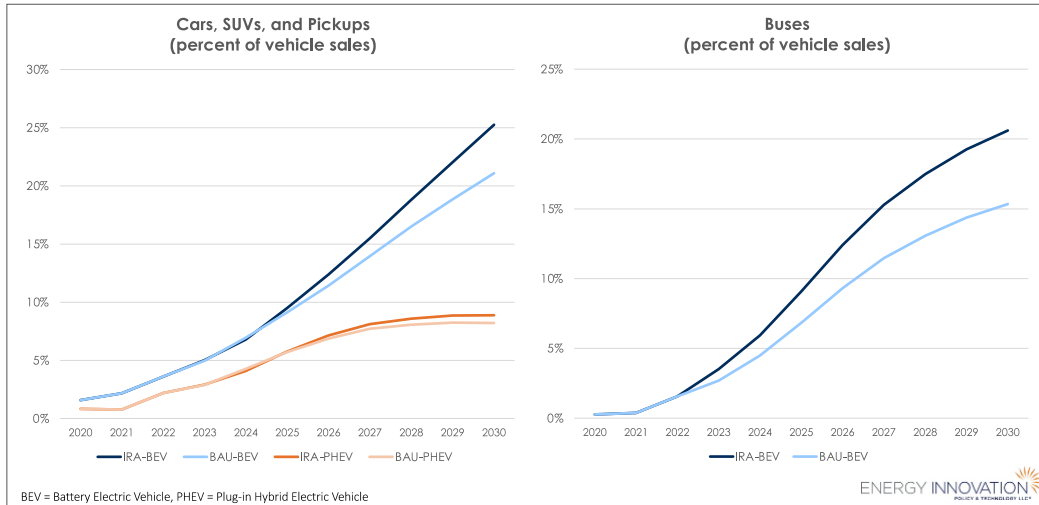


Figure 5. Percentage of EV sales of cars, SUVs, pickup trucks, and buses, based on Energy Innovation® modeling of the IRA incentives (under the moderate scenario for growth)

Light- and medium-duty trucks see a significant increase in deployment thanks to the tax credits because they receive the full credit and purchasers of these vehicles are more sensitive to prices. As a result, EV light and medium truck sales increase from 21 percent in BAU to 39 to 41 percent across all three scenarios. Bus and heavy-duty truck BEV sales also increase significantly, up from 15 percent to 20 to 21 percent for buses, and up from 10 percent to 24 to 27 percent for heavy trucks.

Even with higher sales shares, stock shares remain small in 2030. This limited stock increase reflects slow transportation sector turnover rates, whereby only a fraction of the total stock of vehicles is replaced each year. It therefore takes many years before the stock reaches the same share of EVs as sales.

EV Sales of Light, Medium, and Heavy Trucks (BAU vs. IRA, Moderate Scenario)

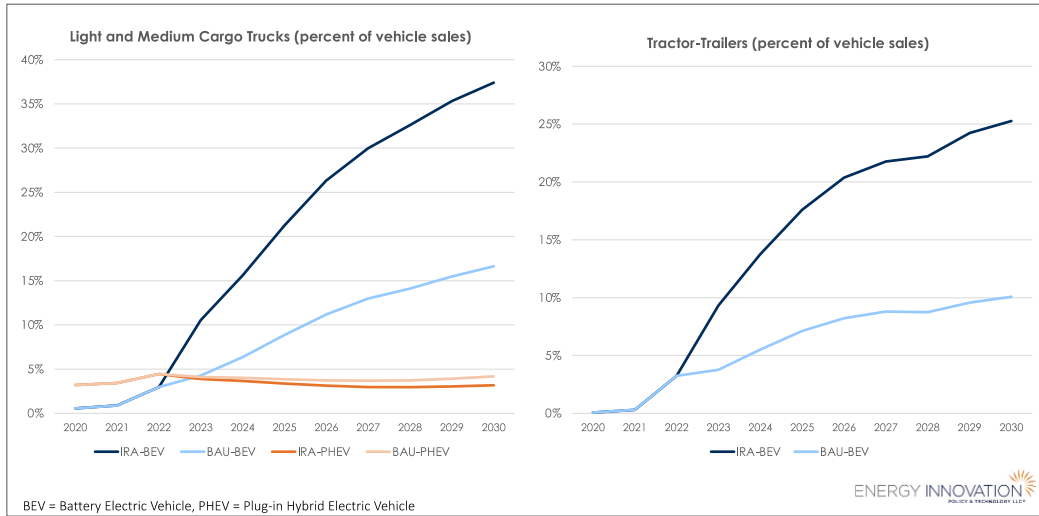


Figure 6. Percentage of EV sales of light, medium, and heavy trucks, based on Energy Innovation® modeling of the IRA incentives (under the moderate scenario for growth)

POLICY IMPLICATIONS AND RECOMMENDATIONS

Questions remain about how IRA incentives for EVs, especially the more stringent passenger vehicle eligibility requirements, will impact the near-term consumer experience and the EV market. Over the long run, the IRA’s clean transportation provisions will support a domestic EV supply chain and deploy more clean vehicles on the road, especially commercial vehicles. But faster action is needed for the U.S. to achieve emissions reductions in line with a safer climate future. Policymakers’ continued attention to issues surrounding the electrified transportation transition are paramount to ensuring long-term success.

EPA AND STATE CLEAN CAR AND TRUCK STANDARDS

IRA incentives are a good start, but the EPA should adopt stringent tailpipe standards, and states should continue to adopt clean car and truck standards to motivate widespread market transformation.

Increasingly rigorous federal vehicle standards are key to unlocking the EV market’s full potential to reduce GHG emissions and other harmful air pollutants while reducing costs for all models. The EPA’s efforts to update and revise tailpipe emissions standards for passenger cars and light trucks, as well as medium- and heavy-duty vehicles, should reflect accelerated advances in clean vehicle technologies and changing market trends.

Given its directive to reduce transportation sector GHGs and other pollutants, EPA should swiftly develop and adopt more stringent tailpipe standards that make EVs the most attractive compliance option for auto manufacturers and support domestic investments in mass production of EVs across all brands and vehicle classes. The upcoming rulemakings for LDVs and medium- and heavy-duty vehicle tailpipe standards are ripe opportunities for EPA to leverage these historic EV and charging investments by adopting stringent standards for all vehicles.

States should continue adopting clean car and truck standards to send a strong market signal that EVs are the transportation choice of the future. These state standards will help level the playing field across the industry and encourage manufacturers to make more EV models for more consumers. Recognizing that transportation represents the single largest source of statewide GHG emissions and air pollution, California's recent push to phase out internal combustion engines with the Advanced Clean Cars II rule set a new high bar for other states to emulate.

Massachusetts, New Jersey, New York, Oregon, and Washington have all adopted California's Advanced Clean Trucks rule, and more are expected to follow suit. State leadership on clean transportation, including adopting incentives for vehicles and infrastructure, will help drive down emissions faster than just the IRA incentives.

U.S. TREASURY DEPARTMENT INCENTIVE GUIDANCE

The Treasury Department's guidance on passenger vehicle incentives should provide clear direction on the new eligibility requirements for consumers.

Although EVs are cheaper to own than their gas counterparts, uptake has languished among lower- to middle-income consumers. The IRA changes this paradigm through several measures. Limiting eligibility to people with low to middle incomes and to modestly priced vehicles, creating the point-of-purchase allowance, and adopting the used EV tax credit all help more Americans buy, drive, and benefit from clean vehicles. However, the complex eligibility requirements for new passenger EVs could confuse prospective buyers and complicate transactions, creating new roadblocks to EV adoption.

Treasury Department guidance on these incentives should clarify how the value of the critical minerals provision will be determined, how the percentage of battery components and minerals will be documented, and how vehicle data will be obtained and shared publicly to support consumers and dealers. All relevant information should be accessible via the VIN, and the guidance should direct auto dealers and manufacturers to deploy a single coordinated approach to communicating this information to consumers in a simple way.

Policymakers should also consider allocating additional support for training and education on the new eligibility requirements for auto industry workers, new and used auto dealerships, and state transportation officials. State and local governments should consider sponsoring educational

campaigns to make more consumers aware of EV benefits, new incentives for used EVs, and updated eligibility requirements for the tax incentives for vehicles and charging infrastructure.

Educational campaigns should target buyers of all incomes in multiple languages, offered through diverse outreach platforms that reach a wide audience. Engagement with community organizations, nonprofits, and local governments could extend the campaigns' reach in targeted underserved communities.

ADDITIONAL SUPPORT FOR COMMERCIAL EV ADOPTION

The new commercial incentives for commercial EVs and charging will clean the air and improve public health, especially in frontline communities, but additional support is needed to streamline commercial EV uptake.

The new commercial EV tax credit (including for use in fleets) will grow a still-nascent market segment and encourage more commercial drivers to switch from polluting gas- and diesel-fueled vehicles to clean EVs. Because the commercial EV incentive is not subject to the passenger EV incentive's more rigorous requirements for critical minerals, components, or income thresholds, near-term adoption will be more feasible for businesses and drivers.

The increase in the per-charger maximum from \$30,000 per location to \$100,000 per charger will help businesses install Level 2 and DC fast chargers to expand workforce and fleet charging, addressing concerns over charging infrastructure availability. Together, these two tax incentives will help fleet operators and businesses electrify the more than 8 million commercial vehicles and trucks used in fleets in the U.S. today, while saving businesses and truck drivers money.

Since medium- and heavy-duty commercial vehicles are the largest contributors to harmful nitrogen oxide emissions (a precursor to smog and soot) and are responsible for about 25 percent of the transportation sector's carbon dioxide emissions,³¹ scaling the nascent commercial EV market will also deliver enormous climate and public health benefits. Communities adversely impacted by truck traffic and harmful diesel pollution will benefit most from the uptake of clean commercial vehicles.

Policymakers and state transportation authorities should coordinate with fleet operators, truck drivers, gas station owners, and businesses to make them aware of the commercial EV and charging tax credit, invite input on challenges, and inform local strategies to increase uptake. States should consider adopting additional incentives and financing programs for commercial EVs and fast charging that leverage the IRA tax credits and further reduce the higher up-front costs of medium- and heavy-duty vehicles (especially for small business owners).

Utility regulators should direct their utilities to investigate managed charging and smart EV charging rates that support commercial EV charging in alignment with grid reliability and affordability objectives. And state and local governments that own and operate large fleets should

lead by example by setting EV purchase requirements and expanding their own internal charging infrastructure.

ENSURING RESPONSIBLE PRODUCTION AND SUPPLY CHAIN DEVELOPMENT

New provisions to boost domestic EV production and supply chains will spur an industry-wide transformation, but policymakers should adopt measures to ensure responsible development.

Since foreign markets control most of the EV supply chain and critical minerals and most EV models are manufactured overseas, major challenges exist to meeting the “entities of concern” requirements in 2024 for battery components and 2025 for critical minerals, respectively. Developing new manufacturing facilities and mining operations, as well as the requisite workforce expansion, will take time. As such, most passenger EVs will not qualify for the full incentive amount in the initial years.

The timeline of the new requirements requires swift action from all stakeholders so that supply-chain development efforts do not bog down in overly burdensome processes. Policymakers can expedite the development of responsible projects, business ventures, and the new facilities by adopting supportive ordinances, while also accounting for the concerns of impacted communities and the environment.

As automakers and supply-chain providers work to meet new requirements for critical minerals and battery components, policymakers at all levels of government should avoid or minimize the adverse impacts of manufacturing, mining, and processing facilities. New projects will undoubtedly pose conflicts relating to land use, environmental justice, and air quality—all of which must be proactively addressed. Irresponsible mining and manufacturing practices of the past should not be the presumed template for new projects.

Policymakers should proactively include representatives from impacted communities and environmental organizations in the permitting, zoning, and development processes, to both avoid negative impacts and to identify ways to amplify local benefits and expedite remediation. All involved stakeholders should ensure that this industrial revolution is grounded in principles of environmental justice, equity, and environmental conservation.

ELECTRIC GRID INVESTMENTS TO SUPPORT EV GROWTH

Regulators and utilities should prioritize prudent investments in a reliable, clean, and resilient electric grid to support EV growth.

The electric grid will play an increasingly important role in the transition to EVs. In the face of more extreme weather events, reliability and resilience of the grid must remain top priority for electric utilities, utility regulators and governing bodies, and charging companies. State policymakers, in partnership with EV stakeholders and utilities, should take advantage of the \$65 billion in IIJA

funding for projects that enhance grid reliability and resilience, expand and upgrade transmission lines, improve grid flexibility with demand response and distributed energy resources, and boost cybersecurity.³²

Electric utilities and regulators should incorporate aggressive forecasts for EVs and charging into ongoing grid planning proceedings, and future investments should support the build out of adequate transmission and distribution infrastructure and generation capacity to reliably meet electricity demand from these vehicles.

According to the 2035 2.0 Transportation Electrification study led by Grid Lab, Energy Innovation®, and the University of California, Berkeley, achieving a 90 percent clean grid and 100 percent electric new vehicle sales by 2035 would increase electricity demand growth by about 2 percent per year through 2050, requiring an average of 105 GW new wind and solar and 30 GW of new battery storage *each year for the next 30 years*.³³

A corollary analysis, led by E3 in partnership with GridLab and University of California, Berkeley, found that the 2050 annual revenue requirements for distribution upgrades for the same scenario ranged from \$2.8 to \$20 billion.³⁴ As such, grid planning and utility investments should be proactive, not reactive, when it comes to EVs. Regulators should also prioritize adoption of complementary regulatory tools to facilitate streamlined integration with the grid, such as smart interconnection standards for EV charging, smart rate design, managed charging, and demand response programs.

CONCLUSION

The IRA provides foundational long-term support for the U.S. EV market, but the near-term challenges associated with its implementation must not be overlooked. More stringent vehicle tailpipe standards and adoption of state and regulatory policies supportive of EV growth should remain front and center as the U.S. transitions to clean, electrified transportation, which we must do if we are to effectively address climate change. Fortunately, adopting more EVs will benefit consumers and the U.S. economy, creating jobs and improving public health. The transition is underway, and now is time to accelerate our collective efforts.

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