

MARKET INSIGHTS

The Future of the Global Electric Vehicle Industry



SLATE

Introduction

The world is facing a climate crisis and decarbonizing our transportation systems will be vital to reducing global greenhouse gas emissions. The adoption of electric vehicles is accelerating around the globe, and will require vast investment to build out the infrastructure required to support the transition away from gas engines.

In this white paper, we will examine the current status of the industry, how government policies are driving increased adoption of EVs around the world, the scale of investment in charging infrastructure that will be required, and how Slate is positioned to capitalize on opportunities in this space. For the purposes of this white paper, “electric vehicle” includes battery electric vehicles and plug-in hybrid electric vehicles.

The EV Industry Today

In 2012, only 120,000 electric vehicles were sold worldwide. A decade later, in 2022, sales of electric vehicles reached 10 million, an increase of 55% from the previous year. At the start of 2023, approximately 26 million electric vehicles were on the road.¹

The rapid rise of the EV has been driven by several factors. Over the last decade, as the threat of climate change has become increasingly urgent, countries around the world have adopted aggressive targets for decarbonization. The UK government has announced plans to ban the sale of new petrol and diesel cars by 2030. Similarly, the European Union has approved a law to ban the sale of new diesel and gasoline cars by 2035, just five years later. And Canada has already adopted legislation to prohibit the sale of new gas cars and light-duty trucks, also by 2035.

To accelerate this shift, governments around the world have implemented massive subsidies and incentives to encourage EV adoption. For example, the passage of the U.S. Inflation Reduction Act in 2022

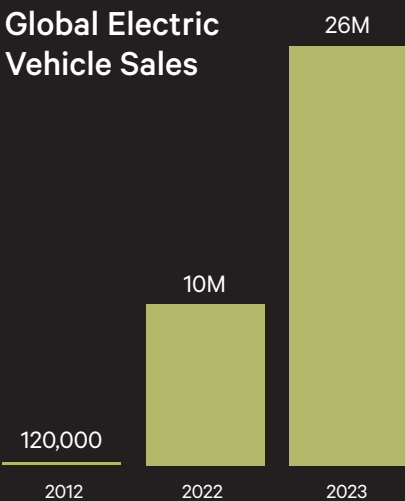
offers American consumers a \$7,500 tax credit on the purchase of new EVs. Overall, the Biden administration has proposed \$174 billion in spending to support the deployment of EVs, with the goal that half of all new vehicles sold in the United States are electric by 2030.

Additionally, as governments have been making plans to phase out gas engines, car makers have been ramping up their EV offerings. The number of available electric car models reached 500 in 2022, more than double the options available in 2018.² And virtually every global automaker has plans to significantly expand their EV lineup, with new models arriving in showrooms every quarter.

In 2022, global spending on EVs grew by 50% to reach \$425 billion, representing 14% of total vehicle sales.³ The pace of adoption of EVs has proceeded at different speeds in different regions.

Europe has been a leader, driven by a combination of supportive government policy, higher gas prices and greater population density. However, adoption in the U.S. is now growing rapidly. With new financial incentives available to consumers and a growing list of models on the market, EV sales in the U.S. increased by 55% in 2022 and now account for 8% of all sales, with the pace of EV adoption expected to continue accelerating.⁴ In the European Union, one in every five cars bought in 2022 was an EV.⁵

Global Electric Vehicle Sales



2022 Electric Vehicle Sales Adoption

8% In the United States



20% In the European Union



¹ <https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEVO2023.pdf>
² <https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEVO2023.pdf>
³ <https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEVO2023.pdf>
⁴ <https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEVO2023.pdf>
⁵ <https://www.iea.org/reports/global-ev-outlook-2023/executive-summary>

Current momentum in EV sales can only be sustained if ever larger shares of the population gain access to convenient and affordable charging infrastructure, both publicly available and private chargers at residences and workplaces, among other destinations.

By the end of 2022, 2.7 million publicly accessible chargers were available worldwide, with nearly 900,000 installed in the last year.⁶ The number of publicly accessible chargers has been growing at a rate of roughly 40-55% per year since 2015.

The number of public fast chargers in Europe was up by over 55% to nearly 70,000 in 2022. This includes 12,000 public fast chargers in Germany, 9,700 in France, and 9,000 in Norway. The United States has about 28,000 fast chargers, of which nearly 75% are Tesla superchargers.⁷

Governments will have to continue facilitating investment and minimizing barriers to the roll-out of charging infrastructure to sustain this growth.

Future Outlook

An IEA analysis of existing climate-focused policy pledges assumes that EV penetration could reach 30% of all vehicles sold globally by 2030. However, to achieve global net zero CO₂ emissions by 2050, electric vehicle adoption would need to be closer to 60% by 2030, with roughly 300 million EVs on the road.⁸

As auto manufacturers rapidly expand their EV offerings to meet growing consumer demand, and millions of new EVs hit the road, the demand for EV charging locations is rising equally quickly.

In the U.S., where adoption has lagged behind Europe and China, the federal government is taking aggressive steps to accelerate its transition. In April 2023, the U.S. Environmental Protection Agency proposed its most stringent ever vehicle emissions standards, which, if adopted, would accelerate the shift to EVs and remove 10 billion tons of carbon emissions⁹ from the atmosphere through 2055. The agency projects that the rules would lead to the electrification of two-thirds of new cars and SUVs and 50% of heavier trucks by 2032.



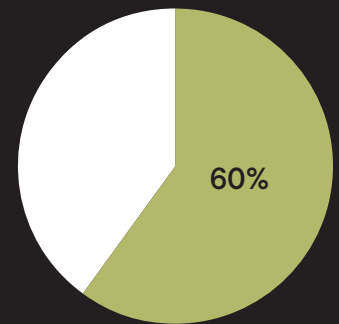
⁶ <https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEV02023.pdf>
⁷ <https://iea.blob.core.windows.net/assets/dacf14d2-eabc-498a-8263-9f97fd5dc327/GEV02023.pdf>

⁸ Global EV Outlook 2022, IEA

⁹ <https://www.epa.gov/newsreleases/biden-harris-administration-proposes-strongest-ever-pollution-standards-cars-and>

EV Adoption To Achieve 2050 Net-Zero Targets

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Investment in charging infrastructure is expected to exceed \$1 trillion globally over the next two decades. By 2040, approximately 340 million to 490 million chargers will be needed globally. To meet this demand, annual investment in all types of charging is expected to increase from approximately \$13 billion in 2021 to nearly \$36 billion in 2025, before peaking in the range of \$75 to \$135 billion annually by around 2040.¹⁰

The availability of chargers at home and work is expected to grow 60-fold by 2050. While fast public chargers are projected to represent just 3% of total installations, they will account for 40% of investment because they are substantially more expensive to install, due to material costs, safety considerations, permitting and labor. A typical home charger installation may cost anywhere from \$300 to \$1,200, while public installations can be as high as \$100,000.¹¹

U.S., Europe Accelerate Charger Installations

In order to meet the demands of EV growth in the short term, the U.S. will have to increase annual charger installations by roughly 600% over the next four years. While the current administration is targeting the installation of 500,000 public charging stations by 2030, the U.S. will need closer to two million to meet anticipated demand, requiring an investment of approximately \$28 billion. The investment required to complete more than 20 million private charger installations over the same period is expected to be \$31 billion.¹²

According to the European Electric Vehicle Charging Infrastructure Masterplan, up to 6.8 million public charging points are required by 2030 in order to reach the proposed 55% reduction in greenhouse gas emissions¹³ for passenger cars. That means up to 14,000 public charging points need to be installed per week between 2021 and 2030 for cars – compared to just 2,000 per week currently. By 2030 a total amount of up to €280 billion will need to be invested in installing public and private charging points, upgrading the power grid, and building capacity for renewable energy production.¹⁴

Drivers who can't plug in at home are expected to take advantage of fast chargers installed outside grocery stores, shopping malls and workplace parking lots – places where people spend extended periods of time. Fast chargers are also necessary for long distance highway transportation, where vehicles need to travel long distances over short

periods of time, as well as commercial vehicle fleets. Slow chargers typically use alternating current and can fully charge an EV in four to 12 hours. The latest 360 kW-capable direct current chargers have the ability to add around 62 miles of range in three minutes or fully charge an electric car in less than 15 minutes.¹⁵

Key Challenges

A 2021 survey by McKinsey & Company asked owners of gas cars what holds them back from switching to an EV. Some of the top responses were driving range, battery lifetime, higher vehicle prices, and higher maintenance costs. EV manufacturers are rapidly making progress on each of these fronts, as battery technology improves range and lifetime, and more affordable vehicles hit the market.

But the number one concern, reported by 40% of all respondents, was simple: access to chargers. Their concerns ranged from the location of the chargers, whether they can get access when they need it, and the charging experience itself. It's an understandable concern, considering 50% of car owners in European cities are not expected to be able to install a home charger.

Many governments and private sector companies are working on ways to address these concerns. One solution is to provide real time maps of charging locations that centralize information from multiple operators on one platform. Standardizing charging plugs is another easy win. The charging process can also be improved by standardizing the payment process, and ensuring chargers are located in well-lit areas that feel safe for drivers.

Grid congestion is also a concern where multiple public fast charging devices are located close to each other and share connections to the grid. Electrical grids and related infrastructure will also require reinforcement before public chargers can be widely deployed, including transformer upgrades and network extensions. In Europe, the approximated delivery time for new transformers necessary for typical grid connections is already up to 70 weeks.

In many countries, the process to obtain permits and approvals to install public chargers is slow, costly and needlessly complicated. Streamlining this process represents low hanging fruit in the push to accelerate the rollout of chargers and EVs.



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¹⁰ Barclays, North America Clean Technology, August 2022

¹¹ Barclays, North America Clean Technology, August 2022

¹² Barclays, North America Clean Technology, August 2022

¹³ [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698781/EPRS_BRI\(2021\)698781_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698781/EPRS_BRI(2021)698781_EN.pdf)

¹⁴ <https://www.acea.auto/publication/european-electric-vehicle-charging-infrastructure-masterplan>

¹⁵ <https://electrek.co/2022/10/31/uk-fastest-ev-charger-gridserve/>

Slate's Investment Thesis

All of this adds up to a generational investment opportunity for owners of essential real estate, and those investing in the energy transition. While investment in charging infrastructure is expected to top \$1 trillion globally, achieving net zero emissions by 2050 will require more than \$275 trillion in capital investment across all physical assets, according to McKinsey & Company.

Slate is taking advantage of this opportunity through its impact infrastructure strategy, which is targeting opportunities in renewable energy, electrification, decarbonization of the built environment and sustainability of supply chains.

As a property owner, Slate is well positioned to capture synergies between real estate and infrastructure investment strategies and has a built-in pipeline of attractive and proprietary investment opportunities. For example, the firm has significant holdings of grocery-anchored real estate in both Europe and North America, all of which will ultimately require EV charging infrastructure.

When you consider that permitting and approvals are one of the main barriers to EV infrastructure rollout, Slate's deep knowledge and expertise of changing market regulations and building requirements provides another competitive advantage.

For example, Slate has taken up a majority ownership stake in amperio, a company based in Germany that develops and operates EV charging infrastructure. amperio is focused on sites with high traffic flow, grocery stores or other retailers, and other specific-use cases such as hospitals. The company has more than 800 charging sites in its development pipeline, including at grocery-anchored real estate owned by Slate in Europe. And Slate has an exclusive right to invest in charging infrastructure developed by amperio.

In late 2022, Slate and amperio announced a new strategic partnership with ADS-TEC Energy to install innovative public charging stations that bypass the grid and can take advantage of solar power, avoiding the substantial costs associated with upgrading existing electrical infrastructure and alleviating grid congestion.

The ADS-TEC compact "all-in-one" ChargePost system has a charging capacity of up to 300 kW with bidirectional battery storage, charging electronics with up to two DC fast charging points and large displays for advertising, with a footprint of less than two square meters. The system is quiet, easy to install and does not require any network expansion. As an energy platform, the ChargePost not only stores

energy, but can also feed it back into the grid and thus be used for other business models such as grid services.

By using battery storage, very large grid connections can be avoided. This reduces both the network connection costs of a charging location as well as the operating costs in the form of savings in network usage.

With more than \$1 trillion of investment required in charging over the next 20 years, the investment opportunities are endless.

Conclusion

One thing is certain, the rate and pace of investment in EVs and EV infrastructure is rising rapidly. The world's ability to achieve its decarbonization goals depends on it. At COP26, held in Scotland in late 2021, more than 100 signatories including governments, car manufacturers, investors, financial institutions and fleet owners signed a pledge to accelerate the transition to zero-emission vehicles globally by 2040, and no later than 2035 in developed markets.

Investors have taken notice, and firms like Slate are now playing a leading role in facilitating the global build out of EV infrastructure. By targeting opportunities in renewable energy, electrification, decarbonization of the built environment, and leveraging the natural synergies between real estate and infrastructure, Slate is well positioned to benefit from the investment flows associated with EV adoption around the world. ■

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For More Information



Christian Schmid,
Managing Director, Global
Head of Infrastructure
cschmid@slateam.com



Jeff Rodgers,
Managing Director, North
American Infrastructure
jrodgers@slateam.com