

# Annual update on the global transition to electric vehicles: 2022

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The International Council on Clean Transportation (ICCT) reviews progress on the global transition to electric vehicles (EVs) annually, and this briefing is a 2022 update.<sup>1</sup> The annual updates focus on market and policy progress made at the national and state levels, while city-level progress is highlighted in another annual ICCT publication, *Global Electric Vehicle Capitals*.<sup>2</sup> EVs in this briefing refer to battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hydrogen fuel cell electric vehicles (FCEVs). We consider light-duty vehicles (LDVs) and heavy-duty vehicles (HDVs) and do not examine two-wheelers, three-wheelers, or low-speed vehicles.<sup>3</sup>

## ELECTRIC VEHICLE MARKET DEVELOPMENTS

From the analysis of global EV sales data from EV-Volumes, we highlight seven key features of EV market development in 2022.<sup>4</sup>

### GLOBAL EV SALES SUSTAINED HIGH-INTENSITY GROWTH

As shown in Figure 1, the global transition to EVs hit a milestone in 2022 with 10 million in annual EV sales, a 54% increase from 2021. Cumulative EV sales globally totaled 29 million by the end of 2022. Electric LDVs comprised 99% of global EV sales for the year, and the other 1% were electric HDVs. BEVs remained the dominant technology,

1 Hongyang Cui and Dale Hall, "Annual Update on the Global Transition to Electric Vehicles: 2021," (ICCT: Washington, D.C., 2022), <https://theicct.org/publication/global-ev-update-2021-jun22/>.

2 Marie Rajon Bernard et al., "Electric Vehicle Capitals: Accelerating Electric Mobility in a Year of Disruption," (ICCT: Washington, D.C., 2021), <https://theicct.org/wp-content/uploads/2021/12/EV-Capitals-briefing-v3-dec21.pdf>.

3 In this paper, light-duty vehicles include passenger cars and light-duty trucks. Heavy-duty vehicles include buses and heavy-duty trucks. The cut-off point between light-duty vehicles and heavy-duty vehicles in terms of gross vehicle weight (GVWR) is 10,000 lbs (4,536 kg) for the United States and Canada and 3,500 kg for all the other markets analyzed.

4 "EV Data Center," EV Volumes, 2023, <http://www.ev-volumes.com/datacenter/>.

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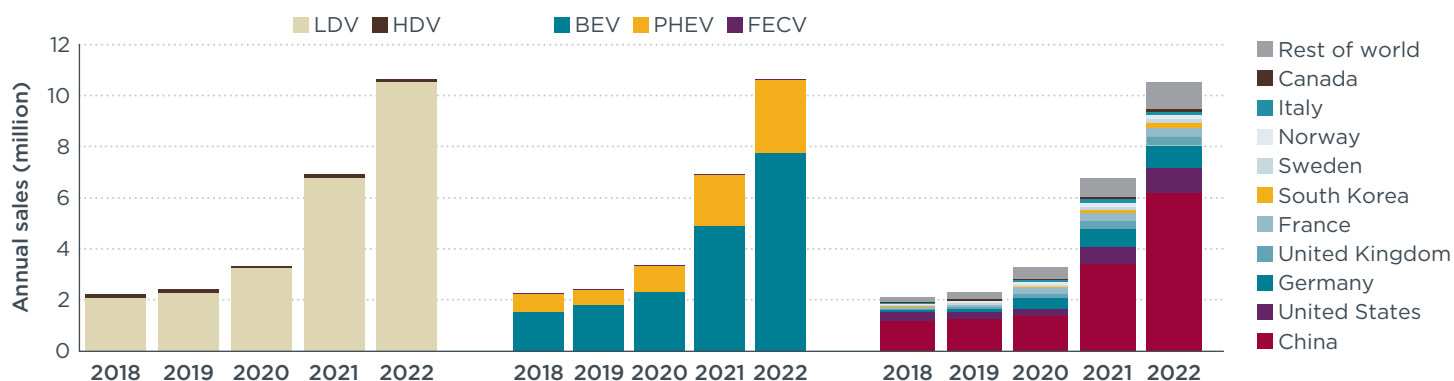
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and these were 73% of all EV sales in 2022. PHEV's market share slightly dropped from 28% in 2021 to 27% in 2022, while FCEV's market share declined for a sixth consecutive year and represented 0.2% of global EV sales in 2022.

China remained the world's largest EV market. In 2022, 6.2 million EVs were sold in the country; that was an 82% increase from 2021, and China's sales represented 59% of the global total. Europe as a single market sold 2.7 million EVs in 2022, a 15% increase from 2021 and 25% of the global total.<sup>5</sup> With 994,000 EV sales in 2022, the United States resumed its place as the second-largest national EV market, after briefly being supplanted by Germany in 2020 and 2021; 2022 sales were up 50% from the previous year and represented 9.3% of the global total. Rounding out the top five national EV markets in 2022 were Germany (845,000), the United Kingdom (386,000), and France (344,000). Japan hit an all-time high in EV sales of 92,000 in 2022, a 109% increase over the previous year, and improved its ranking from 17th in 2021 to 13th in 2022. Nascent markets in Southeast and South Asia grew their EV sales in the year. For example, Indonesia, India, and Thailand recorded 10,000, 51,000, and 21,000 in 2022 sales, respectively, increases of 1,100%, 210%, and 130% from 2021. Association of Southeast Asian Nations (ASEAN) as a single market sold 39,000 EVs in 2022, a 165% increase from the previous year.

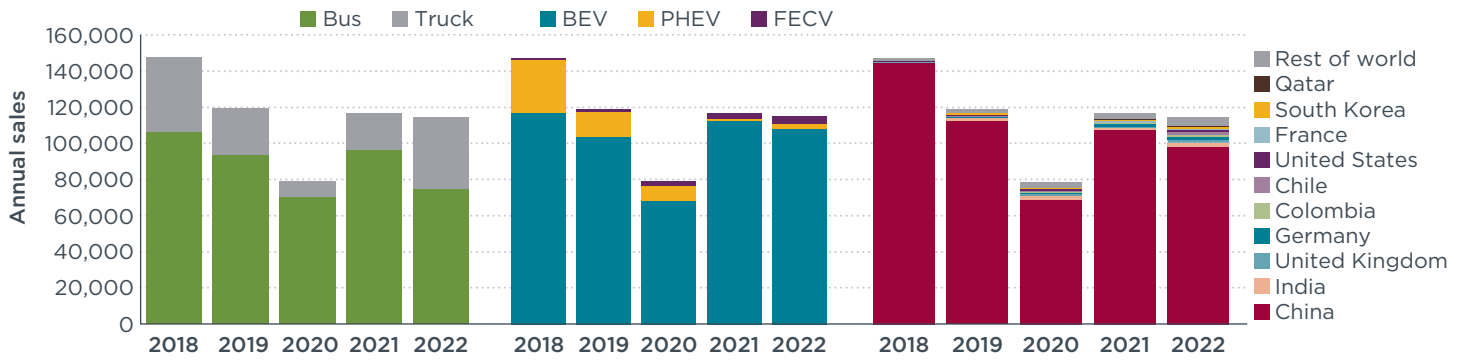


**Figure 1.** Annual electric vehicle sales globally by vehicle category (left), technology pathway (middle), and market (right) from 2018 to 2022.

## ELECTRIC HDV SALES DIPPED SLIGHTLY

Global electric HDV sales slightly declined in 2022 after reversing their previous downward trend in 2021 (Figure 2). Global sales of around 115,000 electric HDVs in 2022 represented a 1.8% decrease year-over-year. This was mainly due to a 22% decline in electric bus sales. By contrast, electric truck sales rose 94% to 40,000 in 2022, almost back to 2018 levels. This resulted in a sharply increased contribution from electric trucks to total electric HDV sales, from 18% in 2021 and 35% in 2022. BEVs remained the primary technology pathway, and these were for 94% of electric HDV sales in 2022. FCEV's share in electric HDV sales sharply increased from 1.2% in 2019 to 3.1% in 2020. In 2022, this percentage further increased to 3.6%. Though China remained the world's largest electric HDV market with around 99,000 electric HDVs sold in 2022, its contribution to the global market decreased to 86% from 92% in 2021. This aligns with the accelerated deployment of electric HDVs in other markets in Asia, Europe, and the Americas. Besides China, six markets sold over 1,000 electric HDVs in 2022: India (1,940), the United Kingdom (1,650), Germany (1,520), Colombia (1,330), Chile (1,320), and the United States (1,300).

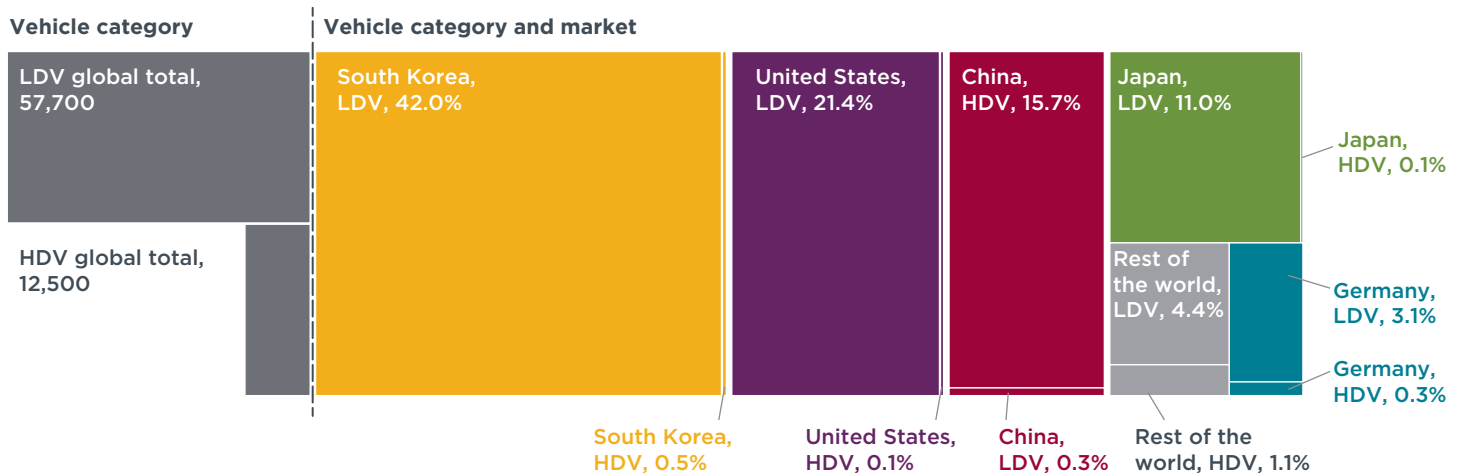
<sup>5</sup> In this paper, Europe refers to the 27 European Union Member States, the United Kingdom, and the countries of the European Free Trade Association (EFTA): Iceland, Liechtenstein, Norway, and Switzerland.



**Figure 2.** Annual electric heavy-duty vehicle sales by vehicle type (left), technology pathway (middle), and market (right) from 2018 to 2022.

### FCEV MARKET REMAINED IN EARLY STAGES

In 2022, around 19,600 FCEVs were sold worldwide. This was a 6% increase from 2021 and these represented 0.2% of global EV sales in 2022. Figure 3 displays the distribution of cumulative FCEV sales globally by the end of 2022 by vehicle category (left) and market (right). Among the 70,200 FCEVs deployed worldwide through 2022, 82% were fuel cell LDVs. South Korea is the world's leading market for FCEVs; its 29,500 in cumulative sales as of 2022 represented 43% of the global total. Rounding out the top five FCEV markets were the United States, China, Japan, and Germany, which were home to 22%, 16%, 11%, and 3.4%, respectively, of the world's total. Fuel cell HDVs comprised 98% of China's cumulative FCEV sales through 2022. Meanwhile, fuel cell HDVs only accounted for 8.9%, 1.3%, 1.1%, and 0.6% of total FCEV sales in Germany, Japan, South Korea, and the United States, respectively.

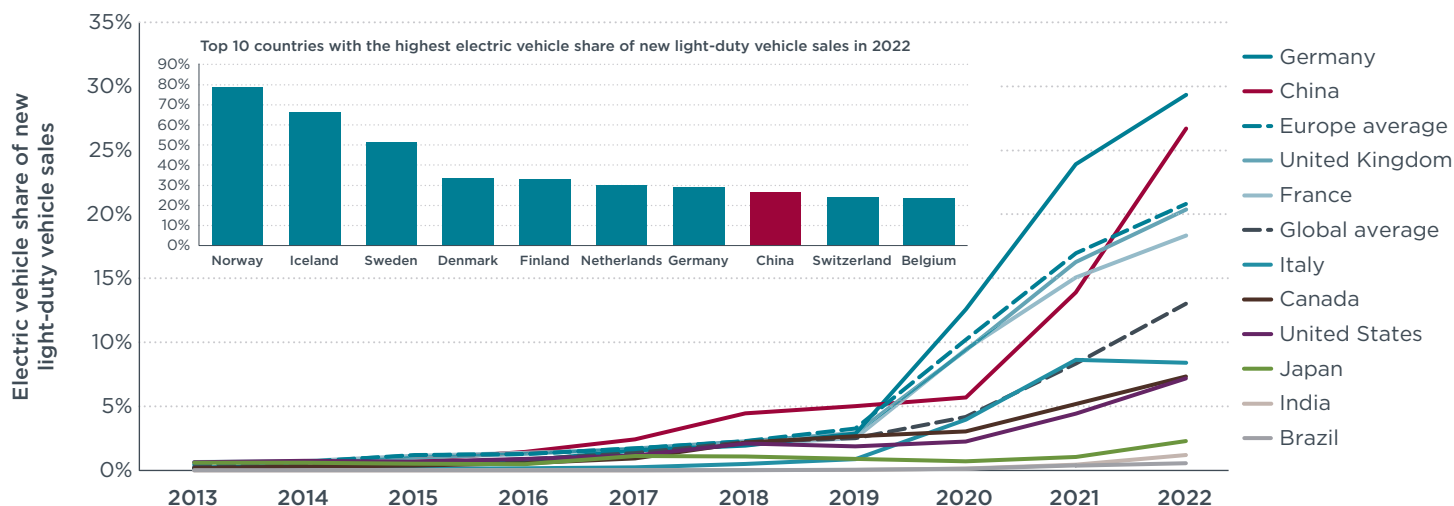


**Figure 3.** Distribution of cumulative fuel cell electric vehicle sales globally by the end of 2022 by vehicle category (left) and market (right).

### ELECTRIC SHARE OF LDV SALES SHARPLY INCREASED

In 2022, the global average electric share of new LDV sales hit a record high of 13%, up from 8.8% in 2021 (Figure 4). This was attributable to a 54% increase in electric LDV sales and a 0.6% drop in total LDV sales globally. European countries maintained their lead in electric LDV penetration: Of the 10 countries with the highest EV share of new LDV sales in 2022, China was the only non-European nation. Norway remained the global leader with a 79% EV share of new LDV sales, and was followed by Iceland (67%), Sweden (51%), Denmark (34%), and Finland (33%). Europe's average EV share of new LDV sales grew from 17% in 2021 to 21% in 2022.

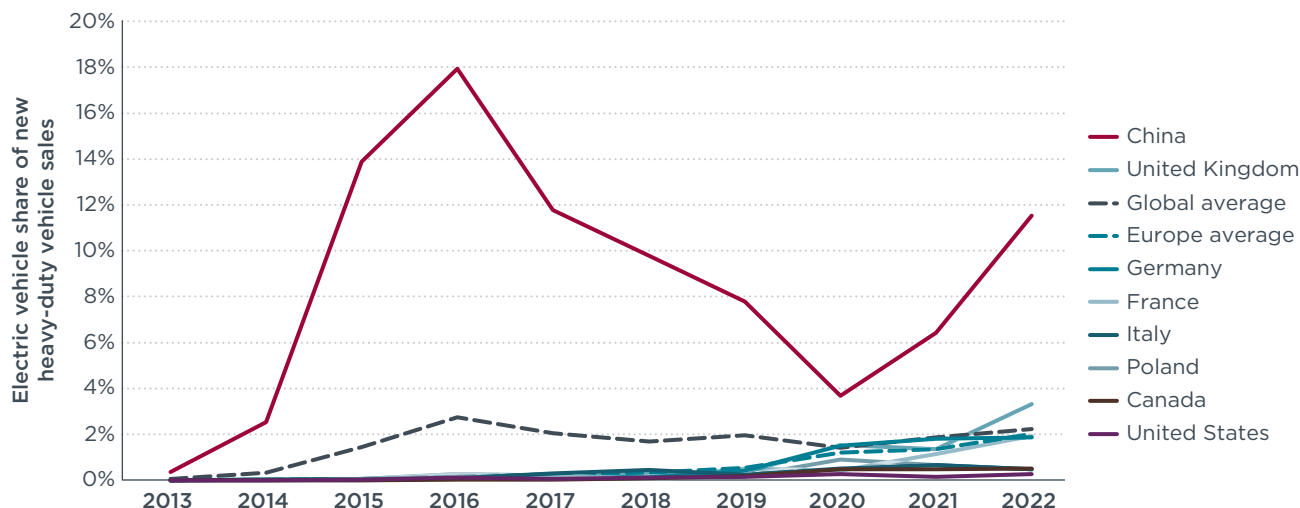
China's electric LDV penetration almost doubled in 2022. Its 27% share was up from 14% in 2021 and two times the global average. This was the first time since 2019 that China surpassed Europe in electric LDV penetration. Among the world's 10 largest LDV markets, only Germany's electric LDV penetration surpassed China in 2022; Germany's electric share of new LDV sales increased from 24% in 2021 to 29% in 2022. The United Kingdom (20%) and France (18%) also exceeded the global average EV share of new LDV sales in 2022. Electric LDV penetrations in the remaining nations that comprise the top 10 LDV markets were all below the global average: Italy (8.4%), Canada (7.3%), the United States (7.2%), Japan (2.3%), India (1.2%), and Brazil (0.6%).



**Figure 4.** Electric vehicle shares of new light-duty vehicle sales for the largest light-duty vehicle markets from 2013 to 2022.

## THE ELECTRIC SHARE OF HDV SALES FLUCTUATED

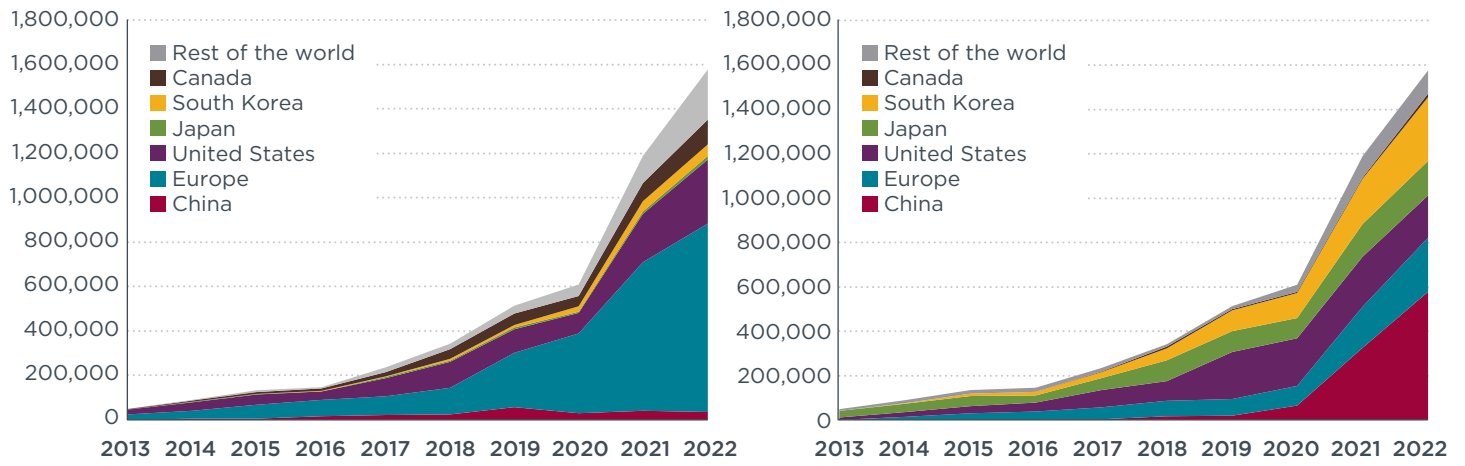
Different from LDVs, HDVs have not shown sustained growth in EV penetration in recent years. As shown in Figure 5, the global electric share of new HDV sales peaked at 2.7% in 2016 and fluctuated around 2% in the following six years. In 2022, 2.2% of new HDV global sales were EVs, up from 1.9% in 2021. China is both the world's largest HDV market and the largest electric HDV market, and it leads the world in EV penetration in the HDV segment. The electric share of new HDV sales in China decreased for four consecutive years after peaking at 18% in 2016, and then bounced back to 12% in 2022. Meanwhile, EV penetration in Europe's HDV market has grown continuously in the past decade; the average electric share of new HDV sales in Europe exceeded 2% in 2022, up from 1.4% in 2021. The United Kingdom hit a record-high 3.3% electric share of new HDV sales in 2022, more than doubling the 2021 level of 1.4%.



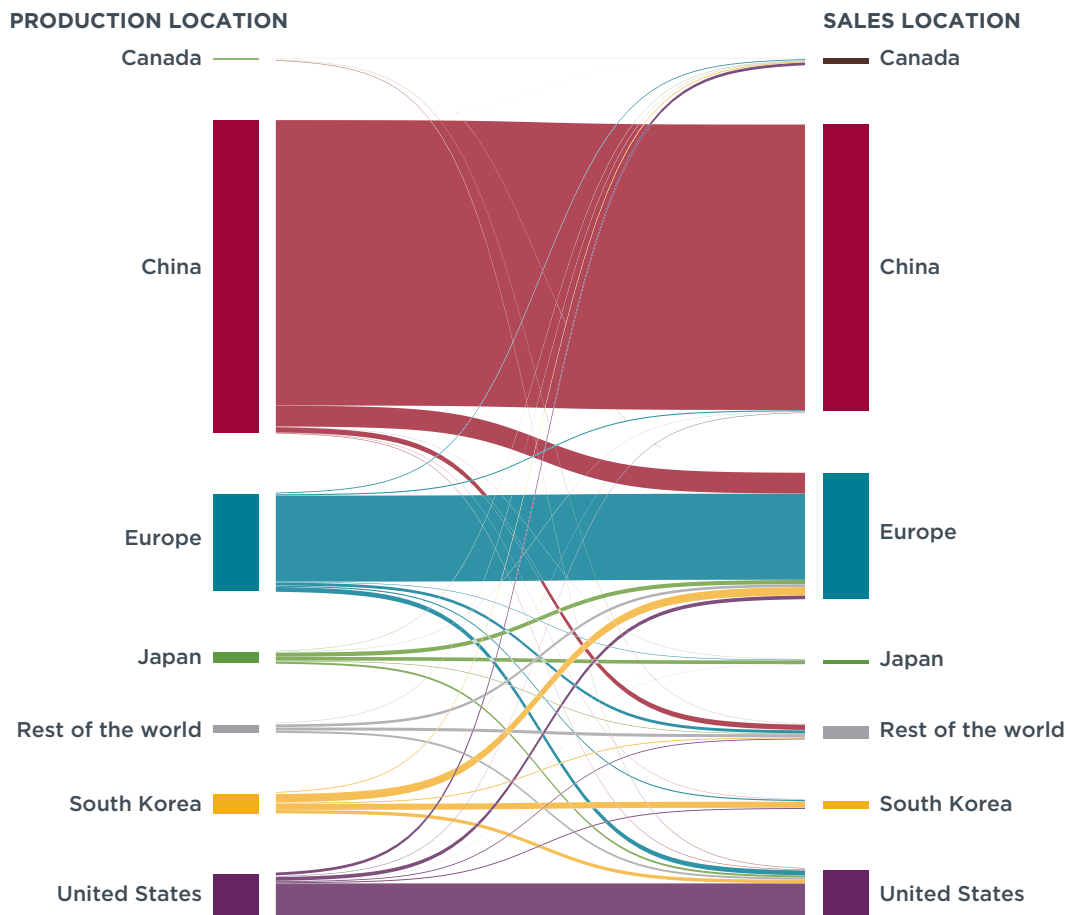
**Figure 5.** Electric vehicle shares of new heavy-duty vehicle sales for the largest heavy-duty vehicle markets from 2013 to 2022.

## THE GLOBAL EV TRADING LANDSCAPE CHANGED

As shown in Figure 6, global EV trading volume has increased steadily in the past decade. In 2022, nearly 1.6 million electric LDVs, or 15% of global total electric LDV sales, were traded between different markets. That was a 33% increase from 2021 in terms of absolute volume. Europe surpassed the United States to become the world's largest electric LDV importer in 2015 and has maintained this position ever since. In 2022, Europe imported around 850,000 electric LDVs, up 27% from 2021. This represented 54% of the global total trading volume of electric LDVs and 31% of Europe's electric LDV sales for the year. On exports, China overtook the United States in 2021 to become the world's largest electric LDV exporter. It enhanced its leading position in 2022 by exporting around 579,000 electric LDVs; that was 37% of the global total electric LDV trading volume for the year and an increase from China's 27% share of trading in 2021. Figure 7 depicts the flow of electric LDVs from place of production to place of sale. Despite the increasing trading volume, over 85% of EVs sold worldwide in 2022 were still produced and sold in the same market. Of the 850,000 electric LDVs imported to Europe in 2022, nearly all came from four nations: China (53%), South Korea (21%), Japan (11%), and the United States (9.5%). Of the 579,000 electric LDVs that China exported in 2022, most went to Europe (77%), Australia (5%), and Israel (4%).



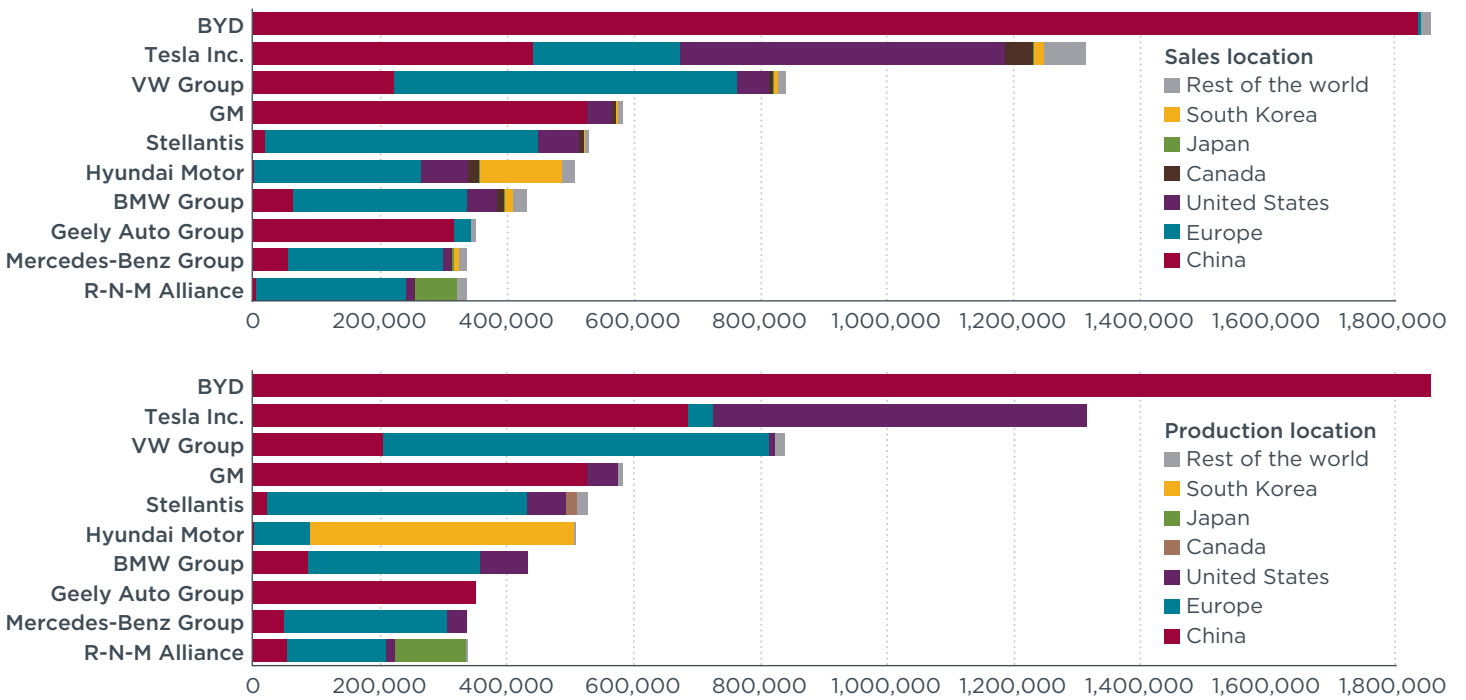
**Figure 6.** Imports (left) and exports (right) of electric light-duty vehicles globally from 2013 to 2022 by market.



**Figure 7.** Production and sales distribution of electric light-duty vehicles globally in 2022.

## THE GLOBAL COMPETITIVE LANDSCAPE WAS RESHAPED

Figure 8 shows the electric LDV sales of the top 10 automakers globally by sales and production locations in 2022. These top 10 automakers collectively comprised 67% of global total sales in 2022. BYD, for the first time, surpassed Tesla to rank first with almost 1.9 million electric LDVs sold worldwide. This represented a 211% increase from 2021 and 18% of global total sales in 2022. Tesla ranked second with 1.3 million in annual sales, a 40% increase from the previous year. As BYD ended production of internal combustion engine (ICE) vehicles in March 2022, both of the top two automakers now only produce electric models. China's Geely Auto Group rose from 20th in 2021 to 8th in 2022 with a 251% increase in electric LDV sales. The other top 10 automakers were all traditional auto giants, which have also accelerated their transition to EVs in recent years. Different automakers have varied their production and sales strategies. For example, BYD manufactured all of its electric LDVs in China, and 99% were sold domestically. Tesla, by contrast, exported 12% of the EVs assembled in the United States and 36% of EVs assembled in China.



**Figure 8.** Annual electric light-duty vehicle sales of top 10 automakers globally by vehicle sales location (top) and production location (bottom) in 2022.

## PROGRESS TOWARD VEHICLE ELECTRIFICATION TARGETS VARIED

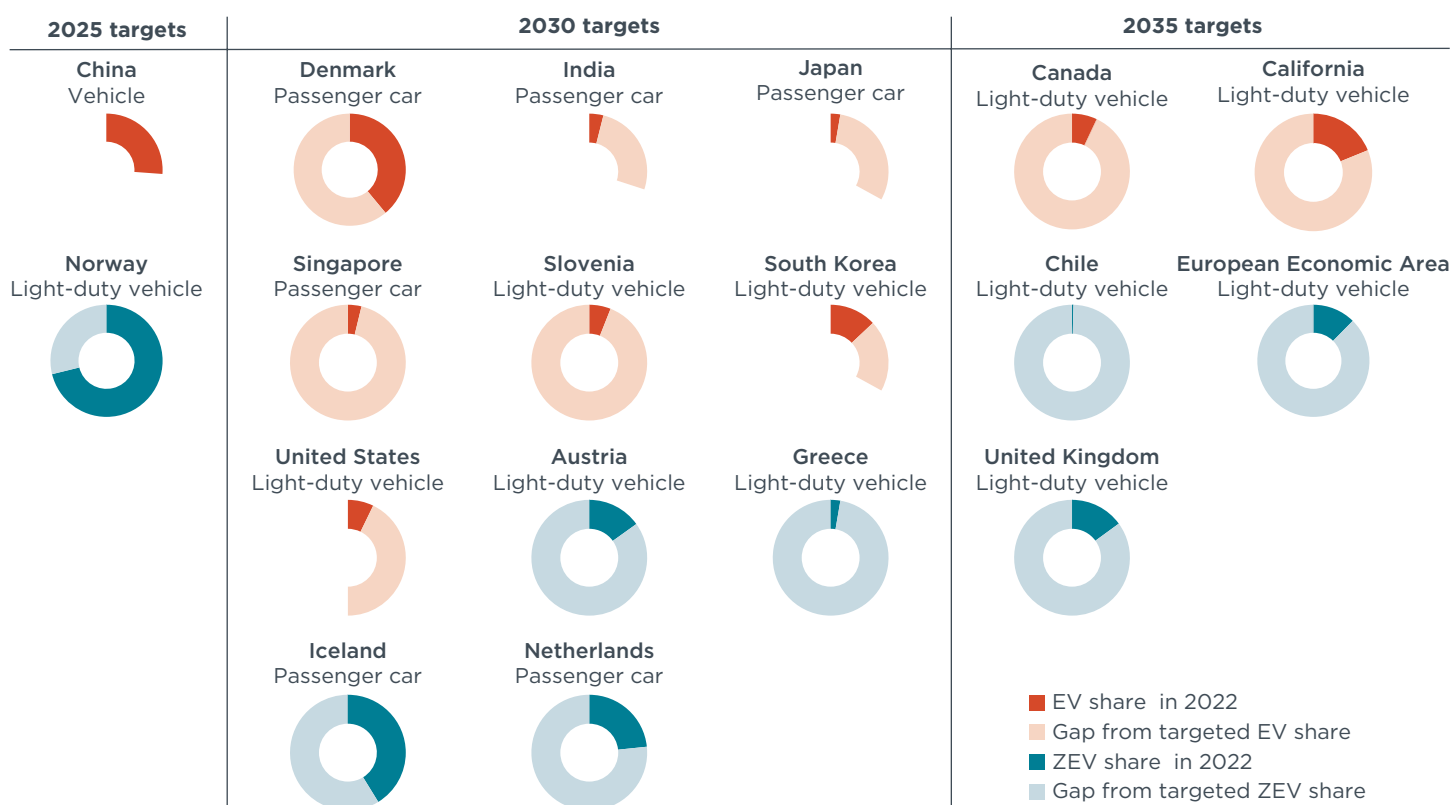
Many countries and states have officially announced vehicle electrification targets, but their progress by the end of 2022 was uneven.<sup>6</sup> Figure 9 compares the targeted EV or zero-emission vehicle (ZEV) share of new sales in select markets with their progress made by 2022; the targets apply to passenger cars, LDVs, or all road vehicles, depending on the market.<sup>7</sup> China's 26% EV share of new vehicle sales already outperformed its 2025 target of 20%, which indicates China could set more ambitious medium- to long-term targets. Norway, with a record-high 71% ZEV sales share in 2022, is in a good position to achieve its 100% zero-emission LDV sales goal in 2025.

<sup>6</sup> "Zero-Emission Vehicles Phase-ins," ICCT, accessed April 11, 2023, <https://theicct.org/ice-phase-outs/>.

<sup>7</sup> In this paper, ZEVs are battery electric and fuel cell electric vehicles.

Denmark, with an EV share of 39% of new passenger car sales, and Iceland, with a 41% ZEV share, are also relatively on track to meet their 2030 goals.

In March 2023, the European Union adopted a new regulation requiring zero carbon dioxide (CO<sub>2</sub>) emissions for new LDVs from 2035 onward.<sup>8</sup> This regulation is applicable to the member states of the European Economic Area (EEA), that is the 27 European Union member states and, pending adoption by the EEA Joint Committee, to Iceland, Liechtenstein, and Norway. With a 12% ZEV share of new LDV sales, the EEA must further accelerate vehicle electrification to reach the 2035 target for a 100% ZEV share of new LDV sales. The other markets shown in the figure were also relatively far from achieving their announced targets.



**Figure 9.** Targeted electric or zero-emission vehicle share of new sales for selected markets and progress made by 2022.

## KEY PROGRESS ON ELECTRIC VEHICLE POLICY DEVELOPMENT

This section summarizes policy progress in 2022 that best reveals EV policy development trends globally, including vehicle regulations, incentive programs, and charging infrastructure strategies and policies. This is not a full list of policies.

### VEHICLE REGULATIONS

In 2022, several leading EV markets took concrete actions to tighten their EV mandate regulations to help convert vehicle electrification targets into reality.

» In April 2022, the United Kingdom initiated a two-month technical consultation

<sup>8</sup> European Council, “Fit for 55: Council Adopts Regulation on CO<sub>2</sub> Emissions for New Cars and Vans,” news release, March 28, 2023, <https://www.consilium.europa.eu/en/press/press-releases/2023/03/28/fit-for-55-council-adopts-regulation-on-co2-emissions-for-new-cars-and-vans/>.



on the policy design for the LDV ZEV mandate; this followed the government's announcement that it was adopting a ZEV mandate in the Net Zero Strategy in October 2021.<sup>9</sup> The proposed mandate would require a percentage of manufacturers' new car and van sales to be ZEVs starting from 2024. The proposed ZEV sales percentage requirements in this round of consultation gradually increase from 22% in 2024 to 100% in 2035 for cars and from 8% in 2024 to 100% in 2035 for vans. The final legislation is expected to be published in 2023.

- » In July 2022, China released a proposal to extend its new energy vehicle (NEV) mandate for passenger cars from 2023 to 2025.<sup>10</sup> Based on the new NEV credit requirements, the EV share of China's new passenger vehicle sales is likely to at least exceed 25% by 2025.
- » In August 2022, California adopted the Advanced Clean Cars II regulation (ACC II), which extends the state's LDV ZEV mandate from 2025 to 2035.<sup>11</sup> Based on the new ZEV credit requirements, the electric share of California's new LDV sales will increase from approximately 8% in 2025 to 35% in 2026 and gradually approach 100% by 2035.<sup>12</sup>
- » In December 2022, Canada released its LDV ZEV mandate proposal for consultation.<sup>13</sup> The proposed regulation sets ZEV sales percentage requirements for LDV manufacturers and importers that start from 20% in 2026 and gradually increase to 100% in 2035.

## INCENTIVE PROGRAMS

In 2022, leading markets continued modifying their national EV incentive programs. The adjustments varied by market.

- » In January 2022, South Korea reduced the maximum purchase subsidy from ₩8 million to ₩7 million for electric cars, and from ₩16 million to ₩14 million for electric light-duty trucks.<sup>14</sup>
- » In June 2022, the United Kingdom stopped subsidizing electric cars and switched to incentivizing electric taxis, vans, trucks, motorcycles, wheelchair-accessible vehicles, and EV charging infrastructure.<sup>15</sup>
- » In August 2022, the United States passed the Inflation Reduction Act (IRA), which extends the existing EV tax credit of up to \$7,500 for 10 years, until December

9 U.K. Department for Transport, "Policy Design Features for the Car and Van Zero Emission Vehicle (ZEV) Mandate," (2023), <https://www.gov.uk/government/consultations/policy-design-features-for-the-car-and-van-zero-emission-vehicle-zev-mandate>.

10 China Ministry of Industry and Information Technology, "Solicit Public Opinions on the Decision to Revise the Parallel Management Measures for Average Fuel Consumption and New Energy Vehicle Credits of Passenger Vehicle Enterprises (Draft)," news release, April 23, 2023, [https://www.miit.gov.cn/gzcy/yjzj/art/2022/art\\_584bce0d78fe4819aa7cf46e8c4094e8.html](https://www.miit.gov.cn/gzcy/yjzj/art/2022/art_584bce0d78fe4819aa7cf46e8c4094e8.html); the NEV mandate is also known as the Parallel Management Regulation for Corporate Average Fuel Consumption and New Energy Vehicle Credits; see more details about the previous versions of this policy at: <https://theicct.org/china-dual-credit-policy-feb22/>.

11 "Advanced Clean Cars II Regulations: All New Passenger Vehicles Sold in California to be Zero Emissions by 2035," California Air Resources Board, accessed April 23, 2023, <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii>.

12 Anh Bui, Dale Hall, and Stephanie Searle, "Advanced Clean Cars II: The Next Phase of California's Zero-Emission Vehicle and Low-Emission Vehicle Regulations," (ICCT: Washington, D.C., 2022), <https://theicct.org/wp-content/uploads/2022/11/accii-zev-lez-reg-update-nov22.pdf>.

13 "Proposed Regulated Sales Targets for Zero-emission Vehicles," Environment and Climate Change Canada, accessed April 23, 2023, <https://www.canada.ca/en/environment-climate-change/news/2022/12/proposed-regulated-sales-targets-for-zero-emission-vehicles.html>.

14 Lee Sae-ha and Minu Kim, "South Korea's EV Subsidies for 2022 to be Cut," *Pulse*, January 21, 2022, <https://pulsenews.co.kr/view.php?year=2022&no=62959>.

15 U.K. Department for Transport, "Plug-in Grant for Cars to End as Focus Moves to Improving Electric Vehicle Charging," June 14, 2022, <https://www.gov.uk/government/news/plug-in-grant-for-cars-to-end-as-focus-moves-to-improving-electric-vehicle-charging>.

2032.<sup>16</sup> To get the full tax credit, the EV must be assembled in North America and meet specific requirements regarding battery and mineral components. The law eliminates the previous tax credit cap for automakers that have sold 200,000 eligible EVs.

- » In September 2022, China released a policy document to extend the vehicle purchase tax exemption for EVs for 1 year, until December 2023.<sup>17</sup>
- » In October 2022, France said it would reduce the maximum EV purchase subsidy from €6,000 to €5,000 starting in January 2023, but that it would increase the maximum subsidy to €7,000 for electric cars and €8,000 for electric vans for lower-income families.<sup>18</sup>
- » In December 2022, Germany announced it would stop subsidizing PHEVs in January 2023. It also reduced purchase subsidies for BEVs from €5,000–€6,000 in 2022 to €3,000–€4,500 in 2023.<sup>19</sup>

## INFRASTRUCTURE STRATEGIES AND POLICIES

In 2022, leading markets further emphasized the importance of developing EV charging infrastructure and continued optimizing their EV charging infrastructure strategies and policies.

- » In January 2022, China released its EV charging infrastructure strategy for the 14th Five-Year-Plan period (i.e., 2021–2025), and it proposed establishing a charging infrastructure network that can serve 20 million EVs by 2025.<sup>20</sup>
- » In March 2022, the United Kingdom released an EV infrastructure strategy that commits £1.6 billion to supporting charging infrastructure development with the aim to have 300,000 public chargers in place by 2030.<sup>21</sup>
- » In June 2022, the United States released the proposal for the mandatory standards for public EV charging stations developed under the National Electric Vehicle Infrastructure (NEVI) Formula Program, which requires installation of at least four DC fast chargers in each charging station and that each DC fast charger have a charging speed of at least 150 kW.<sup>22</sup>
- » In October 2022, Germany approved its Charging Infrastructure Master Plan II, which comprises 68 measures to build up 1 million publicly accessible chargers by 2030.<sup>23</sup>
- » In November 2022, Italy announced it would allocate €40 million to subsidize the

16 Inflation Reduction Act of 2022,” Internal Revenue Service, accessed April 23, 2023, <https://www.irs.gov/credits-and-deductions>.

17 Chinese Ministry of Finance, “关于延续新能源汽车免征车辆购置税政策的公告[Notice on the Extension of Vehicle Purchase Tax Exemption for New Energy Vehicles],” (2022), [http://www.gov.cn/zhengce/zhengceku/2022-09/26/content\\_5712586.htm](http://www.gov.cn/zhengce/zhengceku/2022-09/26/content_5712586.htm).

18 “Ecological Bonus and Conversion Bonus: Changes for 2023,” *Avere France*, January 6, 2023, <https://www.aver-france.org/bonus-ecologique-et-prime-a-la-conversion-les-changements-pour-2023/>; *Reuters*, “France Increases Subsidies for Lower-income EV Buyers,” October 17, 2022, <https://europe.autonews.com/automakers/france-increases-subsidies-lower-income-ev-buyers>.

19 “Funding Guidelines for the Environmental Bonus,” Federal Ministry for Economic Affairs and Climate Protection, accessed April 23, 2023, [https://www.bmw.de/Redaktion/DE/FAQ/Elektromobilitaet/faq\\_elektromobilitaet.html](https://www.bmw.de/Redaktion/DE/FAQ/Elektromobilitaet/faq_elektromobilitaet.html).

20 Chinese National Development and Reform Commission, “关于进一步提升电动汽车充电基础设施服务保障能力的实施意见[Implementation Opinions on Improving Serving Capabilities of EV Charging Facilities Further],” (2022), [http://www.gov.cn/zhengce/zhengceku/2022-01/21/content\\_5669780.htm](http://www.gov.cn/zhengce/zhengceku/2022-01/21/content_5669780.htm).

21 U.K. Department for Transport, “UK Electric Vehicle Infrastructure Strategy,” (2022), <https://www.gov.uk/government/publications/uk-electric-vehicle-infrastructure-strategy>.

22 U.S. Department of Transportation, “National Electric Vehicle Infrastructure Formula Program,” (2022), <https://www.federalregister.gov/documents/2022/06/22/2022-12704/national-electric-vehicle-infrastructure-formula-program>.

23 The Federal Government of Germany, “Charging Infrastructure Master Plan II,” (2022), <https://www.bundesregierung.de/breg-en/news/charging-infrastructure-master-plan-2135836>.

installation of Wallbox EV chargers, capped at €1,500 per charger.<sup>24</sup>

## CONCLUSION

The global transition to EVs made significant progress in 2022, and major markets gradually reopened from the COVID-19 pandemic. Annual global EV sales exceeded 10 million for the first time, a 54% increase from 2021. The global EV share of new vehicle sales also hit a record high of 13%, up from 8% in 2021. The many important EV policy developments in the year included tightened ZEV mandate regulations, adjusted incentive programs, and optimized charging infrastructure strategies and policies. Nonetheless, most markets remained relatively far from their long-term vehicle electrification targets. In addition, the global electrification transition in the HDV sector—which disproportionately contributes to both air pollution and greenhouse gases—remains at an early stage.<sup>25</sup> This indicates the need to further stimulate the global transition to EVs, especially in heavy-duty segments, in the coming years. The ICCT will continue tracking progress made in the transition to EVs and support the acceleration of this transition through targeted technical research.

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24 “Electric Car Incentives Italy 2023,” *Idealista*, November 3, 2022, <https://www.idealista.it/en/news/financial-advice-italy/2022/11/03/171617-electric-car-incentives-italy-2023#How+the+2023+electric+car+incentives+work>.

25 “Vision 2050: A Strategy to Decarbonize the Global Transport Sector by Mid-century,” (ICCT: Washington, D.C., 2020), <https://theicct.org/publication/vision-2050-a-strategy-to-decarbonize-the-global-transport-sector-by-mid-century/>.