

Automotive

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2020 review

2020 was a tumultuous year for the automotive industry. Global light vehicle sales declined 14%, severely impacted by the COVID-19 pandemic in the first half, before a stronger than anticipated recovery in the second. This recovery was supported by a combination of deferred purchases, fiscal and monetary stimulus from governments and central banks globally, and market-share gains from public transportation due to social distancing and people escaping to less densely populated areas.

We continue to believe the trends of **electrification, autonomy and connectivity** represent the biggest revolution in the automotive industry since Henry Ford unveiled the Model T in 1908.

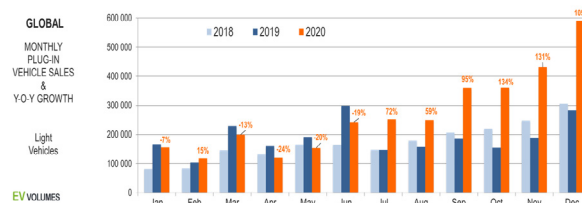
Electrification

Despite the pandemic, global plug-in electric vehicle (PEV) sales growth reaccelerated to 43% in 2020 (from 10% in 2019 and 65% in 2018) to just over three million units, or 4.2% penetration given the overall industry decline. However, adoption remains highly dependent on government regulation. In Europe, EV registrations increased 137% in 2020 (in a vehicle market that declined by 20%), taking market penetration to 10.2% (up from 3.3% in 2019), accelerating during H2 to 260% y/y in December (equivalent to 23% penetration). This was driven by a combination of the 95g CO2 mandate, incentive boosts by green recovery funds, new attractive models with increasing availability, as well as intense promotion by automakers. Germany was particularly strong, with PEV sales up 254%. Europe now represents 43% of global EV sales. In China, new energy vehicle (NEV) sales had a strong recovery during the second half (an average growth of 80% y/y from July to December), although this largely reflected 2H19 weakness due to subsidy costs. Sales were up by 12% for the year taking penetration to 5.5%. EV sales in the US increased by a meagre 4%, despite the sales start of the Tesla Model Y.

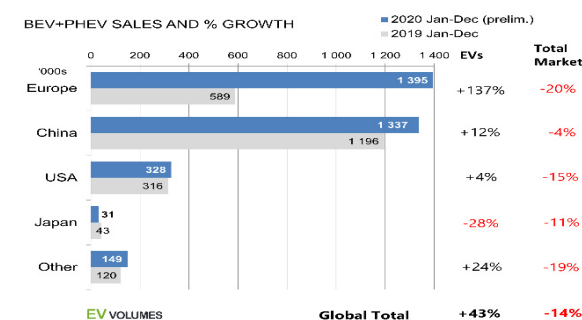
Is demand sustainable in the near term?

Penetration higher than it appears

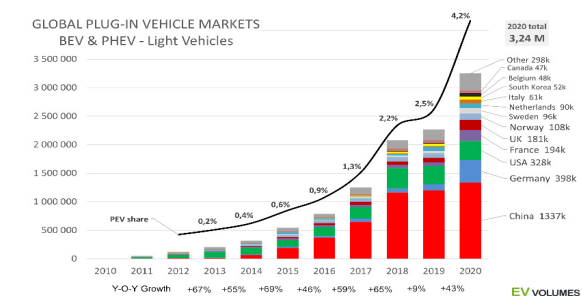
The average EV costs £28k in the UK, limiting the addressable market. That is £5k more than a comparable internal combustion engine (ICE) model (including a £3k subsidy), although EVs are already competitive from a total cost of ownership perspective (over 14 years). The gap is set to narrow due to the falling cost of EVs and the rising costs of producing ICEs. Long term, we expect to see global EV adoption accelerate a, EV production ramp up and battery costs come down.



Source: ev-volumes.com



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Another issue that limits the addressable market today is the lack of charging infrastructure for those that do not have the capacity to charge their vehicles at home – approximately one-third of UK homes have no off-street parking.

Demand may have benefited from temporary factors

Demand during 2H20 was boosted by purchases that were deferred during the first lockdown, and by people moving to rural areas or looking to avoid public transport in urban areas. Given ongoing lockdown measures in many regions, these factors are likely to continue, but could fade during the year.

Regulatory/subsidy tailwinds may fade

In China, the government delayed EV subsidy cuts in 2020 due to market weakness, phasing out subsidies with a 20% (\$550) cut in 2021 and 30% in 2022, but this is less severe than the complete elimination of subsidies for vehicles with <250km, 45-60% cuts for those with >250k range in 2019. The China 6 emissions standards and other incentives remain drivers though. The government is still targeting NEVs to be 20% of auto sales by 2025. In Europe, Euro 6 emission standards and government incentives should continue to drive adoption in 2021, while the European Union is in the process of formulating Euro 7. In the US, the Democrat clean sweep should be a positive for EV adoption, with tighter emissions standards, an extension of EV credits, loans for EV and battery manufacturing, replacement of government fleets with EVs, and infrastructure build-out likely.

Market growth forecasts

IHS Markit forecast BEV (battery electric vehicles) sales to surge 70% in 2021, while longer-term penetration expectations have materially accelerated. IHS expects volumes to grow to 12.2 million units in 2025, while BNEF predicts that 26 million EVs will be sold annually by 2030, equating to 28% penetration. This looks more than achievable given Europe achieved 10.2% penetration in 2020, accelerating to 23% in December (with France at 19%, Germany 27%, Sweden 49%, Netherlands 72%, Norway 87%) while numerous countries are outright banning ICEs in the 2030-40 timeframe. In the UK, Prime Minister Boris Johnson recently unveiled plans to bring forward a ban on selling new petrol, diesel or hybrid cars from 2035 to 2030.

Tesla significantly outperformed in 2020, driven by strong execution – nearly 500,000 deliveries, up 36% y/y despite the pandemic – and several positive catalysts (Battery Day, S&P 500 inclusion), combined with easy monetary policy and retail investor enthusiasm. Driven by regulatory pressure and the threat of disruption, global automakers have accelerated the rollout of their electric vehicles. Tesla retained its market-leading position in 2020 with 16% unit share of the PEV market (down from 17% in 2019), but its domination is being challenged by Volkswagen in Europe (13% share in 2020, up from 6% and outsold Tesla in Q4) and SAIC (9% in 2020, up from 6%) in China, among others. At the Tesla Battery Day, Elon Musk said that Tesla plans to reach 20 million EV sales per annum by 2030, but that would put Tesla at almost double the current market share of ICE leaders Volkswagen and Toyota in the conventional car market.

Musk has also suggested solar/energy storage could be bigger than the automotive business, but it is hard to imagine the company will have much spare battery capacity. We are also sceptical of management's claims that they will launch full self-driving capability in the near future given the technical, legal and regulatory hurdles (but this could be a game changer).

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PHEV+BEV

PI	OEM (BEV+PHEV)	2020 FY	%
1	Tesla	499 535	16
2	Volkswagen Group	421 591	13
3	SAIC	272 210	9
4	Renault Nissan	226 975	7
5	BMW Group	195 979	6
	TOTAL	3 124 793	100

Source: ev-volumes.com

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Autonomy

We continue to focus more on advanced driver-assisted systems (ADAS) than fully autonomous vehicles (AV), given that meaningful volumes are likely to be five-plus years away bearing in mind technical, testing/validation, financial, legal, regulatory and societal hurdles. The automotive industry has come to the same conclusion, with most OEMs (original equipment manufacturers) focused on delivering lower level ADAS to meet regulatory requirements (automatic emergency breaking, driver monitoring etc) and systems which augment the driver rather than replace them. According to Semicast, level two ADAS including infrared driver monitoring systems might reduce fatalities by 90-95%, at a fraction of the cost of full autonomy. That said, AVs are operating at a limited scale in geo-fenced areas today such as robo-taxis, long-haul trucking and last-mile logistic services. **TUSimple**, a recent IPO, is testing a fleet of 40 autonomous trucks between freight depots in Phoenix, Tucson, Dallas, El Paso, Houston and San Antonio and is on track for a 'driver-out' demonstration in 2021. Middle-mile trucking is an ideal application for AV. Operating along fixed routes and highways reduces complexity, while the value proposition is apparent, given that the driver represents 39% of variable cost per mile. The company plans to build and supply autonomous trucks (with partners), as well as offer freight as a service across the US by 2024, which looks achievable given 10% of the nation's trade corridors account for nearly 80% of goods moved.

Connectivity

Our view remains that autos are at the leading edge of the Internet of Things. By 2023, IDC expects worldwide shipments of connected vehicles to reach 76.3 million units, approaching 70% penetration of light vehicles driven by consumers, automakers and governments. For passenger cars, connectivity enables over the air software updates, in-vehicle infotainment and a range of revenue-generating services, like emergency breakdown assistance (e-call has been mandatory in all new cars in the EU since April 2018). It may also be a crucial component of higher-level autonomy systems (vehicle-to-vehicle/infrastructure communication).

Paul Johnson

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