

THE VIEW

Economic Research

04 April 2019



ELECTRIC VEHICLES: FROM HORSE TO POWER

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EXECUTIVE SUMMARY



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- Mobility is changing from car to concept, and electric vehicles (EVs) – eventually connected and potentially autonomous – are a key feature of this transformation. This upheaval has the potential to upend the global automotive industry - especially in Europe.
- How countries adapt to electrification has huge implications for the survival of their auto industries in the years to come. In this context, we construct a ranking based on indicators such as policy, infrastructure and critical components to compare Europe, a core protagonist of the automotive industry, with other key automotive producers and determine who is best prepared for the disruption of the century and who lags behind.
- We find that China leads the world on electrification, topping our ranking for six out of nine indicators, thanks to a powerful policy mix, subsidies for manufacturers and ambitious plans to increase EV charging points. But Europe trails behind China, the US and Japan, especially in terms of policy, infrastructure and critical components.
- Despite these headwinds, Europe does stand a chance to regain leadership, given European car manufacturers' financial strength and ability to translate R&D capability into strategic innovation. But these companies will need to deploy capital to scale up quickly and promote adoption amidst a relative lack of political support, as well as ensure their weight as partners in broader mobility ecosystems.



Photo by Jannes Glas from Unsplash

3.39

**China's score puts it at the top of our
electrification ranking**

THE ELECTRIFICATION SCORE CARD

Mobility is changing from car to concept, and electric vehicles (EVs) – eventually connected and potentially autonomous – are a key feature of this transformation. This will see the emergence of mobility ecosystems that encompass services and data to go far beyond just transport. But this transformation has the potential to upend the global automotive industry – especially in Europe. The region faces major headwinds that could erode its competitive position and leadership within the global industry.

Progress in electrification will be one of

the defining features of success for the automotive industry in the years to come. But some countries have already made more progress than others. To determine who is best prepared and who lags behind, we construct a ranking of the regions and countries that dominate the automotive sector, considering Europe as a whole to account for common policy; infrastructure; market presence and scale across Eurozone countries. The ranking is based on the following indicators: policy, infrastructure, critical components, scale, market presence, innovation

& financial strength, changing vehicle fleet, readiness, competitiveness & evolution of the electricity system, and raw materials.

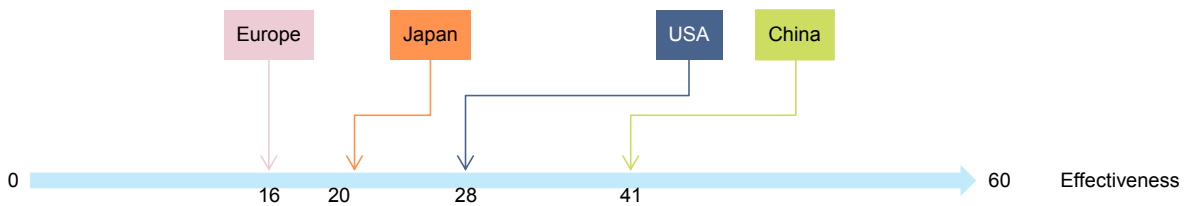
We translate each indicator into a point ranking for our regions and then aggregate the results to establish global leadership in the electrification of mobility. Our analysis shows that China takes the lead by a margin, followed by Japan and the US on almost equal footing - all outpacing Europe.

Figure 1 Euler Hermes point rating of global EV leadership

	Leader:			
	1.	2.	3.	4.
Policy	China	USA	Japan	Europe
Infrastructure	Japan	China	US	Europe
Critical components	China	Japan	US	Europe
Scale	China	US	Europe	Japan
Market presence	Europe	China	Japan	US
Innovation and financial strength	Europe	US	Japan	China
Changing vehicle fleet	China	Europe	US	Japan
Readiness, competitiveness and evolution of the electricity system	China	Europe	US	Japan
Raw materials	China	Europe	Japan	
Global leader	China	US	Japan	Europe
Point score	3.39	2.25	2.24	2.10

Sources: Euler Hermes, Allianz Research

Figure 2 Euler Hermes point rating of regional EV-related policies



Sources: Euler Hermes, Allianz Research

Policy

We attribute a point rating range to each type of policy for its effectiveness by nature. We then attribute a particular rating within that range for each policy by country. The highest overall point score defines the leader. Chinese policy clearly stands out as the most powerful due to the combination of financial support, imposed mandatory norms and end-consumer action. Industrial, fiscal and trade policy tie in with public procurement and local initiatives. While a planned significant reduction of subsidies for EVs will bring consolidation to the industry, we believe the country has succeeded in building a handful of strong leaders around whom the sector will

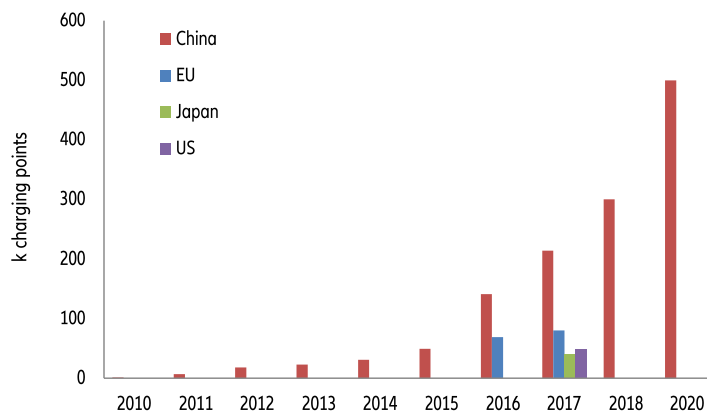
evolve. In the US, mandatory quotas in a number of large states are an effective policy step, which, alongside purchase/tax incentives, are working better than Europe’s policy focus on strong disincentives for conventional cars.

Infrastructure

We give the highest point score to the region with the best infrastructure coverage, i.e. charging stations per EV. The region with the highest point score is considered the leader. While Japan shows the highest EV charging-point penetration per EV (6 EV/station), we still consider China to be the leader because of the sheer size of its credible expansion plan to 500k charging stations by 2020.

Though EV infrastructure is heavily concentrated in the provinces around Shanghai, Beijing and the industrial hotspots of the country, i.e. the South East, this still means that the areas where 95% of the Chinese population lives are characterized by dense coverage. Conversely, 76% of European infrastructure is situated in the Central/Northern hemisphere, on a continent where large distance north-south driving is common.

Figure 3 EV charging infrastructure



Sources: ACEA, Transport & Environment

Critical components

The battery is one of the most expensive and critical components of EVs. But because of low IP content and barriers to entry, economies of scale are crucial for competitiveness. The region where the greatest number of GW of manufacturing capacity are installed and announced gets the highest point score and is the leader. In this context, China's subsidies for EV manufacturers, conditional on the use of approved battery manufacturers, have led to the rapid expansion of the latter in the country. This despite competition from Korean and Japanese manufacturers.

While European politicians have picked up on this, announcing billions of euros in government funding that could double capacity to 6GWh in the region, it will still only account for a fraction of installed and announced capacity in China (over 50GWh).

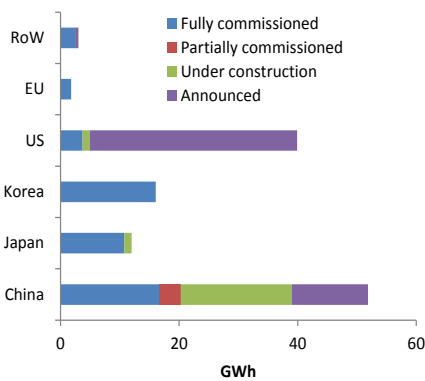
Scale

Scale is measured by market share. The region with the highest cumulative market share of its leading manufacturers in EVs gets the highest point score and is the leader. At this point, China is strongly in the lead with a global market share of 17%, followed by the US, whose market is dominated by Tesla. For European manufacturers to build volume leadership, they need a competitive edge and growth in their own market, as well as significant market share in the US, or meaningful access to the Chinese market.

Market presence

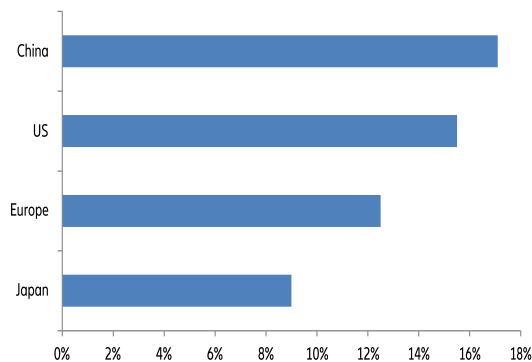
While new models of EVs will have varying degrees of success, we believe manufacturers with a busy launch calendar stand greater chances of success. We attribute the highest point score to the region with the greatest number of upcoming launches. We have estimated launch schedules based on announced strategies, calendars and our view on the transition to electrification by manufacturers. For this indicator, Europe is the leader with 130 out of a total of 350 global upcoming EV launches, according to our expectations. But there is a high degree of concentration amongst manufacturers. Furthermore, we interpret the number of launches as a catch-up effort in light of late starts when compared to Chinese manufacturers, which partly explains why the Chinese launch schedule is lighter. The number of brands in a region also makes a difference. Japan leads ahead of the US in our model largely due to a greater number of brands and greater number of models that we assume will transition to electrification.

Figure 4 Battery manufacturing capacity



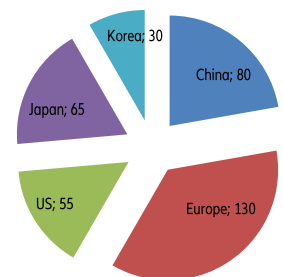
Sources: BNEF, Company data

Figure 5 Global EV market share by regions



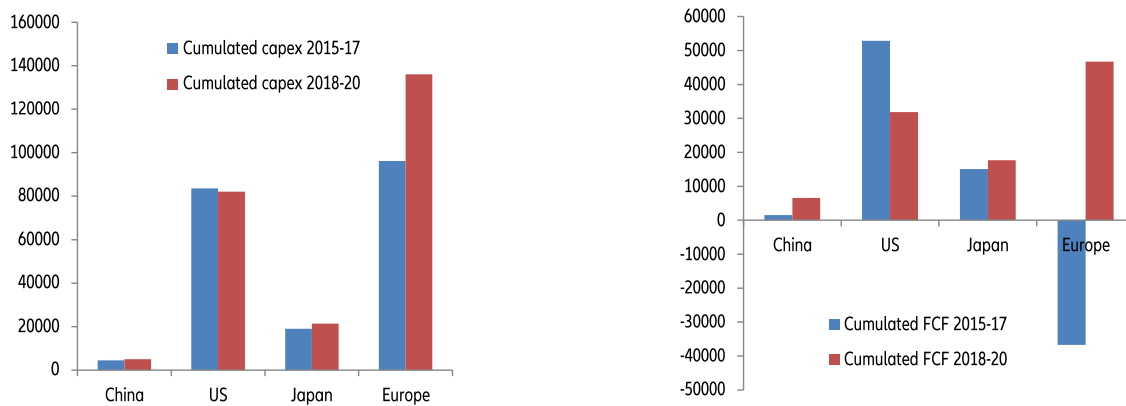
Sources: BNEF, Company data

Figure 6 Number of likely EV model launches 2019-23



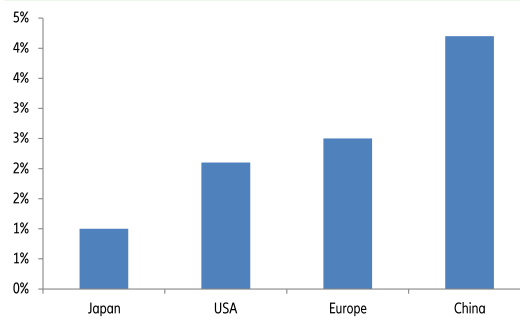
Source: Euler Hermes

Figure 7 Capex and free cash flow of the largest global automotive manufacturers by region (USDm)



Sources: Bloomberg consensus, Euler Hermes

Figure 8 EV sales as % of new car sales



Sources: InsideEVs, EVAdoption, ACEA

Innovation and financial strength

An important differentiator will be companies' ability to dedicate capex budgets and R&D spend to electrification. Financial ratios are translated into a point rating by the greatest cash flow swing, largest absolute amounts of capex and lowest leverage as components. The Chinese companies within our EV basket are expected to see an aggregate USD 5bn cash flow swing from 2018 to 2020 when compared to 2015-17 (source: Bloomberg consensus). While there is a greater absolute swing in Europe, this results from the large Dieselgate payments. Also, cash flows in Europe are much more diversified than the Chinese ones, which are very concentrated around EVs. Considering absolute numbers, there is more cash available in Europe, the US and Japan (USD 42bn, USD

37bn and USD 18bn of cash flows over 2018-20, respectively) than in China. One could argue that those amounts could be channelled towards EVs and therefore Europe should be considered the leader. We think, though, that the "traditional" car manufacturers do not have that choice as they need to maintain their presence and spend in the conventional markets. Those markets still account for the lion's share of their business. Chinese companies have another advantage: access to finance. The Chinese names exhibit significantly higher rates of gearing, evidenced by net debt to Ebitda 2018e of 3.7x vs 1.1x for our peer group universe, and we are of the view that supportive banks are an important contributor to that. This view is further supported by a capex to sales ratio in China exceeding that of the global average by 150bps in 2018.

Changing vehicle fleet

EV penetration is indicative of market acceptance, yet that very acceptance can change very quickly depending on policy, availability of attractive models and cost. The highest level of EV penetration as percentage of new sales determines the highest point rank for the leader. China is in the lead for this indicator as well, with the highest degree of penetration in a very large market - 4.2% of new car sales as compared to 2.5% in Europe.

Readiness, competitiveness and evolution of the electricity system

Here we consider cost of energy, carbon, and the ability of the system to absorb EVs. We judge on a combination of EV demand as the lowest percentage of total electricity demand, lowest cost of growth in de-rated capacity, lowest degree of likely peak strain and lowest average retail electricity price for the combined highest point ranking. Chinese de-rated power generation capacity growth to 2030 amounts to ten times that of Europe so the country is, in our view, in a better position to absorb incremental EV demand. But beyond pure volume, there are other issues:

- System strain from peak reinforcement, particularly the evening peak when motorists charge EVs after returning home. Particularly Europe may require investment for peak capacity build. We estimate that Chinese EV demand will account for 1.1% of total power demand in 2030, compared to about 3-5% in Europe, thus Europe is likely to see a more important peak squeeze, investment

requirement and incentive for charging to move away from peaks. Our calculations indicate European peak demand could increase by 18-41% as a result of EVs.

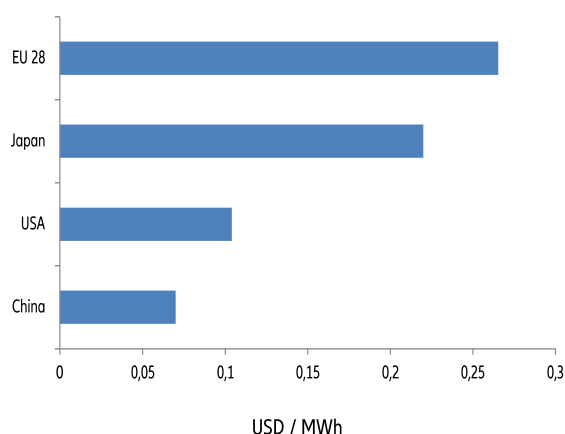
- Strain on local distribution systems that are not designed to cope with concentrated demand from EVs
- Cost of energy. Initially, the cost of electricity may be subsidized by either car manufacturers, infrastructure owners or the taxpayer. We assume there is readiness to accept such costs as part of market penetration, respectively development, strategies. But ultimately, either manufacturers or the public hand or the consumer will make cost of energy on a relative basis part of the consideration. We see China's lead as remaining if not consolidating. Currently the average retail price of electricity in Europe is almost four times as high as that in China, at Eur 226c/kWh. The energy mix will evolve globally, but we estimate that Chinese new build across all sources has an advantage in terms of le-

velised cost of energy (LCOE) in the order of Eur 37-50/MWh vs Europe.

Raw materials

The access to and cost of metals required for batteries, namely lithium and cobalt, are a key factor of success. But none of the major regions have a dominant position in mining. The leading regions with the highest point score are those with the greatest refining tonnage. China leads in terms of processing raw materials, refining 48% of global cobalt, and is Africa's largest trading partner (57% of cobalt is produced in the Democratic Republic of Congo). We have seen M&A activity by Chinese mining companies worth USD 7bn in 2018 (source: Dealogic) across 14 transactions with high-risk characteristics in critical metals. A great risk appetite gives Chinese miners an advantage over Western peers, who have much reluctance to engage in these areas due to risk levels and shareholder pressure related to ethics and governance. Western miners have refrained from major M&A at a point where the commodities cycle may be near its peak.

Figure 9 Retail electricity prices



Sources: IEA, IEA, Eurostat

Figure 10 Global cobalt mining and refining

Country	Mined	Refined	Refined Qty (mt)
Australia	x	x	3,2
Brazil	x	x	400
Belgium		x	6,329*
Canada/Norway (Glencore)	x	x	9,044
China	x	x	45,046 (mainly imported raw material)
Cuba	x		See Canada
France		x	119
Finland		x	11,187 (mainly imported raw material)
India		x	100
Japan		x	4,305
Madagascar	x	x	3,273
Morocco	x	x	1,568
New Caledonia	x		To be updated
Russia	x	x	3,092
South Africa	x	x	1,101
Uganda	x	x	0 (ceased operations 2014)
D.R.C.	x	x	400
Zambia	x	x	4,725
TOTAL			~93,889(Tonnes)**

Source: Cobalt Institute

WHAT ELECTRIFICATION MEANS FOR BUSINESS

Opportunity is plentiful in the context of electrification, especially for the technology, consumer and energy sectors who could benefit more than the automotive industry. However, we expect new emerging companies to capitalise on the new opportunities while established actors may rather take advantage of change in a defensive manner – i.e. a transformation of business resulting from need.

In Europe, a large established market related to the conventional car will progressively disappear and not, as in China, be more than compensated by rapidly growing volumes resulting from broader economic development in an emerging market.

Additionally, we see a number of important risks:

- Commoditisation of hardware, i.e. the car, a major risk for automotive manufacturers. This affects the entire global industry. In a world where mobility means goods and services come to the consumer rather than the other way around, the car may lose some of its secondary attributes as a status symbol, its aesthetic utility etc. Car manufacturers may see a strong dichotomy between a large volume market with very low margins attached to hardware and a small high-end market with elevated margins accessible to very few. The German industry may conserve a competitive advantage in the high-end segment and indeed consoli-

date its position but it may need to move even further upmarket. Partnerships in China that enable access to the market in volume at favourable terms will be major differentiator if not a make-or-break factor. We have recently seen German industry moving that way. That will of course affect the country and later counterparty risk profiles of the companies in question.

- Requirement to deploy capital in a suboptimal way: This could be infrastructure financing in Europe, ownership of such assets, ownership of batteries or other customer subsidies, besides the obvious need for European car manufacturers to rapidly catch up on scale. The European car industry has the required financial fire-power. It needs to be strategic as to deployment. However, competitive pressures in the marketplace may not leave a choice. We expect stiff competition for new opportunities such as infrastructure and ancillary services spanning between EVs, other services in the mobility ecosystem and ancillary services in interaction with energy markets.
- Loss of control over value added, supply chains and customer relationships. Companies need to enter into cross-sector partnerships in order to guarantee survival and complete their offer. There may be competing ecosystems running under

different models, akin to the world of software with the Apple vs Microsoft systems. Participants, current or prospective, could take a make or break decision by opting for one or the other. European industry will participate but question whether it will be a dominant protagonist in such ecosystems. We are seeing inklings that German car manufacturers may look to be protagonists of open ecosystems and through that aim for very wide adoption of very basic models if not to say frames. We believe that this could be successful as it could build up a dominant position on a low margin but large volume item.

In conclusion, despite an environment that is less supportive in terms of policy and infrastructure than other regions, European business, in the automotive or other sectors, can be successful in EVs. We believe, though, it will not fully make up for headwinds and a late start, and a number of companies will see their risk profile increase.

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