

A stylized shield logo composed of three concentric, slightly offset outlines in a dark grey color, centered behind the main text.

PAUL EICHENBERG

STRATEGIC CONSULTING



Executive Summary – Electric Vehicle Announcements

Background:

In early September, Xin Guobin, China's vice-minister of industry and information technology, told a forum of automakers held in Tianjin that the government would ban the production and sale of fossil fuel cars. Although no timetable has been formally announced, most Chinese automotive insiders, including BYD Chairman Wang Chuanfu, believe this ban will take place starting in 2030. This is another example of increasing legislation to curb carbon emissions and control greenhouse gases. China now joins Norway, France, the UK, and India in the ban of future petrol and diesel vehicles.

China is the largest auto market in the world, with more new vehicle sales per year than any other country. The government's announcement is a major shift in direction and a significant turning point in the electrification of passenger vehicles around the world. The move sees China joining the UK, France, and others in establishing national goals for the phase-out of internal combustion vehicles.

The following pages highlight the key announcement, from governments and major OEMs that further highlights the industry is approaching a tipping point towards electric vehicles.



Recent Regulations

The trend towards zero emission vehicles has continued to accelerate (as evident from China and Europe).

Country	Date	Policy
China	May 2016	State Council – Government clarifies the importance of the development of hybrids, BEV's and Fuel Cell vehicles as a long-term goal for the sector. Aims to achieve 1 million domestic brand sales in 2020 and 3 million in 2025, of which domestic brands sales should account for 70-80% of all associated sales respectively.
	Oct. 2016	State Council – sets guidance for 5 million charging stations by 2020.
	Nov. 2016	Industry Minister Miao Wei proposes draft legislation requiring all automakers to sell a specific quota of zero and low emission vehicles, starting at 8% of overall sales by 2018. This target would rise to 10% in 2019 and 12% in 2020. OEMs who fail to comply will pay penalties or would be forced to buy credits from competitors.
	Sept. 2017	China's vice-minister of industry and information technology, informs a forum of automakers held in Tianjin that the government would ban the production and sale of fossil fuel cars. Although no timeline announced, most expect implementation by 2030.
European Union	May 2016	A handful of Dutch politicians have proposed accelerating the shift to eco-friendly cars by banning all new gasoline and diesel-powered models starting in 2025. This legislation was promoted by the Labor Party and approved by a majority of the Dutch parliament's lower house. The proposal calls for the ban of all vehicles that aren't emissions-free, meaning that automakers won't be allowed to sell even hybrids and plug-in hybrids.
	Oct. 2016	German Bundesrat (with support of VW, BMW and Daimler) passed a resolution to ban ICE starting in 2030. The resolution calls for the EU Commission to approve only zero-emission passenger vehicles for use on European roads. Although the Bundesrat (representing German states) has no legislative power, its recommendation will clearly shape the European debate and EURO VII legislation.

Sources: Paul Eichenberg global research, expert interviews



Recent Regulations continued ...

Regulations are not only being driven at the Federal level, increasingly state and local governments are setting guidelines for low and zero emission vehicles.

Country	Date	Policy
European Union continued	Dec. 2016	Paris, Madrid and Athens (in addition Mexico City) ban all diesel vehicles within city limits by 2025. The mayors announced plans at the C40 conference for Mayors in Mexico City. Anne Hidalgo, mayor of Paris, led the initiative at the C40 conference of mayors on climate change, taking place in Mexico. She said: "Mayors have already stood up to say that climate change is one of the greatest challenges we face. Today, we also stand up to say we no longer tolerate air pollution and the health problems and deaths it causes, particularly for our most vulnerable citizens."
	Dec. 2016	London Mayor having already imposed a ultra-low emissions zone, is now proposing a new higher penalty for diesel cars built before 2005, starting in 2017. In addition, UK government is developing plans for EV users to use bus lanes as they look to expand the London concept to Birmingham, Leeds, Nottingham, Derby and Southampton.
	Feb. 2017	EU just announced that all new and renovated homes must have EV chargers by 2019.
	Feb. 2017	Norway becomes the first nation to ban the internal combustion engine and intends to only allow the sale of electric vehicles by 2025.
	July 2017	France joins Norway as France's new President Macron announces ICE ban by 2040. In this announcement, the government's intent is to end the sale of new petrol/diesel vehicles by 2040 to help meet the Paris Climate Accord.
	July 2017	UK's environmental secretary Gove announces ICE ban by 2040. The secretary states, "There is no alternative to embracing new technology."
	August 2017	Chancellor Merkel started public discussion around ban of ICE as Stuttgart becomes the first Germany city to ban diesels starting in 2018. The Green Party announces a formal position "promoting the e-mobility breakthrough ... From 2030, we want only zero emission cars to be newly approved".

Sources: Paul Eichenberg global research, expert interviews



Recent Regulations continued ...

Additional announcements in support of a shift towards EVs.

Country	Date	Policy
European Union	September 2017	Scotland plans to end petrol and diesel car sales by 2032, eight years ahead of the UK's deadline.
	October 2017	Paris Mayor Ann Hidalgo announces a ban of all gas- and diesel-fueled cars within city limits by 2030, allowing only electric vehicles on its streets as a key strategy that will reduce greenhouse gases.
India	June 2017	India is one of the world's most polluted countries. Its energy department states that it has set the "ambitious" target to stop selling gas-powered vehicles in an attempt to clean up its air. Thus, in an effort to support the Paris Climate Agreement, India is making a bold vow to start selling only electric cars by 2030 and ban ICE vehicles.
North America	2012-Today	California was the first state to adopt a policy for zero emission vehicles (such as PHEVs & BEVs) by 2025. Under the policy this equates to approximately 1.8 million new car sales or 15% of all vehicle sales. Since, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, Vermont, Maine and New Jersey are now committed to the same policy raising the total to 3.3 million vehicles. From 2018, manufacturers are required to meet ZEV credit targets by producing a certain proportion of the sales as PHEVs and BEVs.
	Jan. 23, 2017	Quebec legislation approves a new law that requires automakers to sell a minimum number of electric, plug-in hybrid and hydrogen fuel-cell vehicles. Starting with the 2018 model year, 3.5% of all auto sales in the province will have to be from those types of vehicles. That threshold will rise to 15.5% for 2025 models. Quebec is the only province that has such legislation in Canada thus far.

Sources: Paul Eichenberg global research, expert interviews



Global OEM Electric Vehicle Announcements

Major OEMs have recently set new aggressive global targets for EVs.

OEM	Major Announcement	Activities/Goal
VW	Nov. 2016 – June 2017 – Roll-out of MEB EV platform, part of “ <i>Transform 2025</i> ” corporate strategy.	VW Group (VW, Audi and Porsche) will invest \$84 billion in EV development as part of the “Transform 2025” strategy. VW group targets 2-3 million EVs per year and Porsche plans 50% of sales from EV by 2023. All in total, 80 new electric models by 2025 (previously 30) with group plans on EV/hybrid versions of 300 vehicles by 2030.
Daimler	March-September 2017 – Daimler commits \$11 billion investment in EV.	Parent company of Mercedes-Benz, will invest \$1 billion in an Alabama plant to produce all-electric SUV and \$10 billion in EV development overall. Company to electrify the “entire portfolio” by 2022, offering 50 EV/hybrid models. From 2020, Smart will on have EV drivetrain.
BMW	July 2017 – Announcement ~25% of total vehicles to be highly electrified by 2025.	BMW develops a new vehicle architecture that will enable “electrification on every model/series.” Goal is restated, 15-25% of total vehicle sales to be EV/hybrid by 2025.
Volvo	July 2017 – Volvo announces “only electrified vehicles starting in 2019.”	Swedish auto manufacturer Volvo, owned by Chinese automotive company Zhejiang Geely Holding Co., Ltd, announced that starting in 2019 the car maker will only produce electric, plug-in hybrid and “mild hybrid” vehicles by 2019. This also includes five EVs to be rolled out from 2019-21 as well as two high performance EVs from a subsidiary.
Jaguar Land Rover	September 2017 – JLR to electrify everything by 2020.	Jaguar Land Rover plans to electrify its entire vehicle lineup by 2020, with new powertrains ranging from mild hybrids to EVs.
PSA	September 2017 – PSA will launch a raft of Full BEVs and hybrids between 2019 and 2022.	PSA wants 80% of its core model to be electrified in some form by 2023. PSA’s PHEV options will start with the DS 7 Crossback in 2019, then the Peugeot 5008 and Citroen C5 Aircross. Two smaller crossovers will also have PHEV option: the 3008 and Grandland X.

Sources: Paul Eichenberg global research, expert interviews
©Eichenberg Consulting, LLC



Global OEM Electric Vehicle Announcements (page 2)

Major OEMs have recently set new aggressive global targets for EVs.

OEM	Major Announcement	Activities/Goal
Renault Nissan and Mitsubishi	September 2017 – Alliance is formed to produce 12 zero emissions vehicles	The Renault, Nissan and Mitsubishi alliance will work together to develop new systems to use across their vehicle lines, with a focus on “purely electric” EVs like the Nissan Leaf. The automakers plan to release 12 all electric models by 2022.
Toyota and Mazda	August 2017 – Plan to build \$1.6 US plant in joint venture.	Toyota and Mazda recently announced that they are teaming up with auto parts manufacture Senso to create a new company to develop basic EV technology for use across multiple vehicle types and models, expanding beyond the Prius line. The carmakers also pledged to build a new US-based plant by 2021, where they’ll work on electric and hybrid vehicles.
Honda	March- 2017 – Honda announces “2025 Electric Vision.”	Honda announces that its aggressive Electric Vision starting with the stated goal that 2/3rds of all European sales to feature electrified powertrains by 2025. In August Honda started hinting towards a similar 2030 global goal.
GM	October 2017 – GM lays out plans to expand electric vehicles and “all-electric future.”	GM said it plans to phase out gas-powered vehicles for an “all-electric future” but didn’t give an exact date for an all-EV lineup. The effort starts,; however, with plans for 20 all-electric vehicles by 2023.
Ford	October 2017 – Ford creates “Team Edison.”	Ford created the EV-dedicated “Team Edison” to focus on the development of all-electric cars. The automaker also pledged to invest \$4.5 billion over five years on new all-electric and hybrid vehicles, with 13 new models slated for release by 2023.

Sources: Paul Eichenberg global research, expert interviews



Global OEM Electric Vehicle Forecast

Significant government announcements and major OEMs have recently set new aggressive global targets for EVs dramatically changing the outlook and forecast for the automotive industry.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2040
Production	88.7	91.4	92.8	95.0	98.3	100.7	102.6	104.4	106.3	108.4	110.4	112.2	113.9	114.7	116.3	118.9	99.8
ICE	86.0	88.1	87.8	86.3	85.0	80.9	75.1	69.0	59.4	49.0	39.4	26.9	15.7	9.8	5.4	5.0	0.0
%	97%	96%	95%	91%	86%	80%	73%	66%	56%	45%	36%	24%	14%	9%	5%	4%	0%
Mild Hybrid	0.3	0.5	1.1	3.8	7.8	12.1	16.4	21.9	28.6	36.8	44.2	52.7	61.5	59.6	59.3	58.9	18.1
%	0%	1%	1%	4%	8%	12%	16%	21%	27%	34%	40%	47%	54%	52%	51%	50%	18%
Full/PHEV	2.0	2.2	2.9	3.4	3.7	4.6	7.1	8.6	10.3	11.7	13.1	13.5	13.8	14.1	14.2	14.5	7.8
%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	0%
BEV	0.4	0.6	1.0	1.5	1.8	3.1	4.0	4.9	8.0	10.9	13.7	19.1	22.9	31.2	37.4	40.5	73.9
%	0%	1%	1%	2%	2%	3%	4%	5%	8%	10%	12%	17%	20%	27%	32%	34%	74%

Key Assumptions:

As part of its industrial policy, China aggressively moves forward with a ban of gas- and diesel vehicles in 2030 in an effort towards being a global leader in BEV technology. As a result, significant automotive economies like German will work to challenge this leadership.

Although these and other major economies have established this timeline to ban these ICE vehicles by 2030, it is not expected for this goal to be fully reached until later in the decade.

Sources: Paul Eichenberg global research, expert interviews, LMC and IHS.



Industry Global Engine Roadmap is Understated

Considering recent announcements, electrification forecasts are understated for several reasons ...

Why industry forecasts are understated:

- 1. Accelerating global legislation to ban gas- and diesel-vehicles**
- 2. New OEM strategies**
- 3. Cost of compliance is raising the cost of the ICE**
- 4. Cost of batteries will decrease as range increases**
- 5. The cost differential between EV/ICE powertrain is disappearing**
- 6. Consumer preference for EV performance**

Sources: Paul Eichenberg global research, ICCT, Expert Interviews



PAUL EICHENBERG

GET IN TOUCH
www.chief-strategist.com

T: (248) 670-9108
E: peichenberg@chief-strategist.com

25463 Pennsylvania Avenue
Novi, MI 48375