WORK-IN-PROGRESS

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This overview on E-Mobility includes **44 market trend reports** by various research institutes, consultancy firms and independent organizations. Target and plans for **60 countries**, plans by **40 cities or regions** and **12 companies** provide a picture on e-mobility. Visions by **21 automobile companies** are included.

E-Mobility Trends and Targets

As of October 20, 2017

This document compiles information on the development of electric mobility with regard to market trend reports; official targets by countries, cities, and companies; and industry plans. This document is a work-in-progress and will be expanded with additional narrative and data on e-mobility.

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Market Trend Reports

The earliest report about the impact of e-mobility in this overview is from 2006 and over the years the number of publications has increased significantly. So far in 2017 there were 16 reports trying to predict the e-mobility growth. The findings are divided into sales penetration rates, price parity, battery costs and charging infrastructure. These market reports assume that electric vehicles will be cost competitive with internal combustion engine vehicles around 2030.

Regarding penetration rates, all market reports agree that the sales rate of electric vehicles will increase in the coming years, but different assumptions are made about the extent of the growth rates, with absolute projections for electric vehicles on the roads in 2030 varying from 71 to 160 million.

For instance, while Bloomberg's *Electric Vehicles Outlook* believes that 50% of vehicle sales will be electric by 2040, ITDP says that by 2050 very few non-electric vehicles will be sold. McKinsey even suggests that 100% of vehicles sold in 2025 will be electric due to economic trends, consumer demand, and strong regulatory intervention.

We also note that, few reports include details on charging infrastructure, while the development of charging points will be an essential factor for the growth of electric vehicles.

Year	Author	Title	Findings				Remarks/Key Assumptions
			Sales/Fleet Penetration Dimension	Price Parity	Battery Costs/ Battery Capacity	Charging Infrastructure	
2017	Wood Mackenzie	Future of renewables: a radical disruption?	By 2035, the EV stock will be at 350 million and 21% of total fleet will be EVs.				
2017	National Grid	Future Energy Scenarios	By 2050, 90% of all car sales will be electric vehicles. In two degree scenario, all cars sold post-2040 will be electric	EV vehicles to overtake ICE around 2033-2037. Super rapid EV charging and inductive EV charging already available to buy today	Price of EV batteries has fallen by 65 per cent since 2010	In this year's model we have made the assumption that 7 kW chargers become the standard whereas in last year's FES we assumed 3.5 kW. A number of companies are developing flash battery technology that could allow an electric vehicle to run for a long distance from a five minute charge.	The growth in electric vehicles (EVs) will have a significant impact on electricity demand. If not managed carefully the additional demand will create challenges across all sections of the energy system, particularly at peak times. In two degree scenario, 50% of cars will be autonomous shared vehicles.

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2017	ING	Breakthrough of electric vehicle threatens European car industry	By 2035, 100% of car sales will be electric in Europe	High range BEV will be cost competitive by 2024	Battery cost to decline: battery pack prices should go towards $100/kWh in 2025, range could be pushed towards 500km	Ultra fast charging of batteries will enable a 300km charge in 20 minutes	Electric vehicle will have large impact on value chain and job market, Europe's automobile industry in disadvantage
2017	Bloomberg	Electric Vehicle Outlook 2017	By 2040, 54% of new car sales and 33% of the global car fleet will be electric.	By 2029, EV's will have reached price parity with comparable internal combustion engine (ICE) vehicles	Lithium-ion battery demand from EVs will grow from 21GWh in 2016 to 1,300GWh in 2030. 270GWh of large format battery cell production to be online globally by 2021		We expect 80% of all autonomous vehicles in shared applications to be electric by 2040 due to lower operating costs. While we expect PHEV sales to play a role in EV adoption from now to 2025, after this we expect BEVs to take over and account for the vast majority of EV sales. Electricity consumption from EVs will rise to 1,800TWh by 2040 from 6TWh in 2016. While this represents just 5% of our projected global power consumption in 2040
2017	IEA	ETP-2017, B2DS	In B2DS, nearly all two- and three-wheelers are electric by the mid-2040s, and more than 90% of all cars on the road are electric by 2060				
2017	IEA	Global EV Outlook	Electric car stock will range between 9 million and 20 million by 2020 and between 40 million and 70 million by 2025. By 2060, the 2DS projects that 1.2 billion electric cars, representing more than 60% of the total PLDV stock, will be in circulation. In the same scenario, the stock of electric two-wheelers is projected to	2015 powertrain investment costs for European vehicle characteristics range from USD 3 500 for ICEs to USD 7 800 for PHEVs and USD 12 400 for BEVs. The 2030 powertrain investment costs for European vehicle characteristics range from USD 4 700 for ICEs to USD 7 000 for PHEVs and USD 9 600 for BEVs. By 2030, BEVs	In 2015, the battery pack cost is USD 200/kWh for BEVs and 255 USD/kWh for PHEVs. In 2030, the battery pack cost decreases to USD 100/kWh for BEVs and USD 125/kWh for PHEVs	Publicly available EVSE outlets need to grow by a factor that ranges between 8 in the RTS and 25 in the B2DS by 2025, amounting to between 4 million and 14 million outlets globally in 2030. Projections	BEV batteries have a range of 200 km in 2015; PHEV batteries have a range of 40 km. The electric range increases to 350 km for BEVs and 46 km for PHEVs by 2030. In 2015, PHEVs drive 30% of their annual mileage on the electric motor. This rate increases to 80% by 2030. The narrowing cost gap between electric

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			exceed 400 million in 2030 (around 40% of the global total), and two-wheelers become fully electrified by 2055 (IEA, 2017b). Under the B2DS, transport electrification happens at an even faster pace: electric cars represent 85% of the total PLDV stock by 2060, and two-wheelers are fully electrified by 2045.	and PHEVs will become fully cost competitive with ICEs in Europe, where fuel taxes are estimated to be high and vehicle attributes (namely power) more favourable to electrification than in other regions. High yearly mileage electric cars have clearly lower first-owner TCOs for almost all cases when compared with ICEs. This underlines the interesting synergies between shared mobility services and vehicle electrification		for fast chargers suggest that EVI markets will need to see the deployment of 0.1 million additional outlets by 2025 in the RTS and 0.6 million in the B2DS. Extending the period to 2030 corresponds with 0.2 million outlets in the RTS and 0.7 million outlets in the B2DS.	cars and ICEs suggests that as electric car sales keep growing in the 2020s, governments will need to gradually revise their approach to electric car support, phasing out incentives in cases where BEVs and PHEVs actually rival ICE costs.
2017	UBS Evidence Lab	Electric Car Teardown – Disruption Ahead?	The share of EVs in global annual new car sales is 3% in 2021E and 14% in 2025E (30% in Europe, 5% in US, 13% in Japan) i.e. 23% of global car sales	EV powertrain $9k more expensive today, going down to $4k by 2025E. True TCO parity (true meaning the OEM makes a 5% EBIT margin) should be reached in Europe in 2023E, and in China in 2026E ex subsidies, 2-3 years earlier than previously expected	The battery pack, which is the largest cost item in the Bolt, is likely to become 36% cheaper by 2025E, from ~$12.5k today to ~$8.0k.	We estimate that $14bn investments into charging infrastructure will meet requirements for 19m EVs on European roads in 2025.	Downside scenario: We forecast 5.7m EVs sold in 2025, or 5.5% of global car sales. This scenario discounts a low-to-zero political support level, sustained low gasoline prices and a slower-than-expected consumer response to EVs (TCO concept is not well understood as consumers are focused on vehicle selling prices only).
2017	Morgan Stanley and IHS	Morgan Stanley	16% penetration in 2030 accelerates to 51% by 2040 and 69% by 2050. In our bull case, based on an even more aggressive regulatory regime to accelerate the reduction of emissions, we get to 60% penetration by 2040 and 90% by 2045. Our bear case BEV penetration				

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			model assumes that BEV development proves too expensive, or technically not viable and governments are forced to delay regulatory tightening. In this case, new BEV models grow global share to 9% by 2025, but fade after that				
2017	RethinkX	Rethinking Transportation	New ICE vehicle sales are finished by 2024, just three years after the regulatory approval and commercial availability of A-EV technology. In 2024, the pre-existing vehicle stock can more than meet the passengermile requirement for transport under individual ownership. ICE vehicles eliminated from fleet by end of 2030s at the latest		For EVs we assume that the vehicle will have a 250-mile range by 2020 by increasing the battery size of current vehicles (if required) and applying estimates of increasing battery power density. The other major adjustment we make for EVs is to apply a battery cost of $200/ kWh from 2017		
2017	Goldman Sachs	Rethinking Mobility (Equity Research)	.				VW plans to launch more than ten electric vehicle models by end-2018 and over 30 new battery electric vehicles (BEVs) by 2025. VW's targets that 20%-25% of group sales will be electric vehicles in 2025, and in China alone, c.1.5 mn cars sold will be NEVs (mostly electric) in the same year
2017	McKinsey	An integrated perspective on the future of mobility	The Seamless Mobility system assumes that electric vehicles will comprise nearly 100 percent of light vehicle sales by 2025, driven by a mix of economics, consumer demand, and strong		The expected cost reduction per cumulative doubling of manufactured volumes of EV lithium-ion batteries is around 16–20 percent. Repurposed second-life EV battery		By 2030, electric vehicles could represent 3 percent of global electricity demand – assuming all 50 metropolitan areas marked as potential early adopters accelerate to the future states outlined in

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			regulatory intervention. As a consequence, by 2030 electrification levels in the vehicle parc in Seamless Mobility regions may have reached as high as 60 percent. The cumulative market size for EVs for 2015–30 would rise to 180 million vehicles, out of 1,700 million total light vehicles sales. If local systems accelerate rapidly, global 2015–30 EV sales may reach around 240 million		volumes will rise dramatically. By the mid-2020s a large quantity of used EV batteries will become available for stationary applications. Costs of new batteries could possibly fall as low as $50/kWh– $60/kWh in the longer term (1000 in 2010, 350 in 2015). Early estimates place the cost of repurposing them at around $49/kWh, undercutting the price of new batteries.		this whitepaper, and that the rest of the world's vehicle parc electrifies more gradually
2017	UC Davis, ITDP	3R Report	By 2020, 5 million EVs are sold annually worldwide (compared to 750,000 in 2016), with sales continuing to rise sharply thereafter. By 2050 few non-EVs are sold anywhere. Some EVs may well be plug-in hybrids, but even these we assume are basically phased out by 2050 as longer range EVs and fast charging become ubiquitous.	By 2030, EVs will have an average range of 250 miles (400 kilometers) and an incremental cost of about $10,000 per vehicle. Costs could decline more than this, but our assumed increase in driving range requires larger battery packs, which we consider in our cost estimates. These incremental costs continue to decline to near zero in 2050. EVs in 2030 save enough on energy costs to pay back within five years, even less for high-distance drivers.	Electrification of the drivetrain and cost of batteries together may cost about $10,000 more than a conventional vehicle, reflecting declining battery costs but rising energy storage of batteries on the average EV. Our EV cost projections are roughly consistent with reports such as (McKerracher et al., 2016), though somewhat lower than reports that use higher future battery cost projections such as (Elgowainy et al., 2016		In 2016, the number of different (4-wheel) models available in countries around the world exceeded 100, including everything from electric minicars to plug-in hybrid sport-utility vehicles. the 2017 BMW i3 EV with a 94 Amp-hour battery offers 114 miles of electric range, up from 81 miles in the 2016 model. Notably, the 2017 Chevrolet Bolt EV offers 238 miles of range, a substantial improvement over the 82-mile range of the smaller 2016 Chevrolet Spark EV.
2017	GFEI	Can we reach 100 million electric cars worldwide by 2030? A	To reach a global stock of 100 million PEVs by 2030, sales growth will need to be very rapid and reach somewhere between 20 and	In 2013 PEVs were very expensive for vehicles within this class. While the "modal" price range for these cars was $15-19k, followed closely by			IEA ETP 2 degree scenario, which targets 140 million PEV light-duty vehicles by 2030.

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		modelling/scenario analysis	40 million per year by 2030, depending on the shape of the sales growth curve. From their current levels of about 550,000 units per year worldwide, sales would need to grow by about 28% per year, every year from 2015 to 2030. Along the way they must reach nearly 2 million in 2020, nearly 10 million in 2025, and about 30 million in 2030 – with a combined effect (including some retirements over that time frame) that hits the stock target of 100 million in that year.	vehicles priced at $19-23k, plug-in vehicles in this class were priced at $27k-35k. PEVs were actually very competitive with vehicles in the $31-34k price range, accounting for more than 1/3 of sales; but this is a tiny market segment with total sales of about 50,000 cars out of the 15 million sold in 2013			The 100 million target can be thought of in terms of numbers of PEV models multiplied by the average sales per model. For example, 30 million sales could be achieved with 100 models of PEV selling 300,000 units each around the world in that year, or 300 models selling 100,000 units each; either way a daunting challenge.
2017	IRENA	Electric Vehicles – Technology Brief	A 160 million EVs by 2030. EV markets achieve a "tipping point" between 2020 and 2025, when they start to rapidly increase market share relative to ICE vehicles. Annual EV sales would need to reach 40 million to 50 million by 2030, out of an expected overall market of 120 million to 130 million vehicles, in order for stocks to reach 160 million. EVs would become dominant by 2040, accounting for well over half of LDV sales around the world.	To achieve a tipping point in sales, EVs will likely need to achieve near parity on a first cost basis with ICE vehicles. In the 2015 calculation, with battery pack costs set at USD 350/kWh, EVs typically USD 10 000 more than conventional ICE vehicles, and the hybrids USD 3 000 more. By 2025 or even 2020, with battery costs dropping to USD 50/kWh and the incremental first cost of the EV down to USD 5 000 per vehicle. Fuel costs are somewhat higher by then (USD 1.25 per litre for gasoline and USD 0.14/kWh for electricity). In this case,	For BEVs, a vehicle with 40 kWh of battery capacity may have a battery cost of USD 14 000, leading to a vehicle incremental cost of at least USD 12 000 compared to similar ICE vehicles, depending on retail mark-ups, incentives and other factors. New models to be introduced in 2017 and 2018 will be able to drive up to 300 kilometres (km) per recharge, but battery packs up to 60 kilowatt-hour (kWh), even if battery costs drop from their current levels of		Assuming all these new electric vehicles were to consume 100% renewable electricity, around 450 terawatt-hours (TWh) per year of additional renewable electricity would be required by 2030. This is equivalent to 1.5% of today's total global electricity generation

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				anyone driving more than 15 000 km breaks even on ownership cost. In 2030, with the changes in vehicle costs (particularly the lower battery costs), the breakeven point is much more attractive for EVs: USD 1.25/litre matched with USD 0.16/kWh	around USD 350/kWh to USD 150 kWh in the future, would cost USD 9 000, much more than the drive systems of today's internal combustion engine vehicles.		
2017	Exxon Mobil	2017 Outlook for Energy: A View to 2040	Falling battery costs will enable small, shorter-range electric cars to exceed more than 10 percent of new car sales in the U.S. by 2040, as high cost differentials begin to narrow versus conventional cars Full hybrid vehicles reach approximately 15 percent of the fleet, though many hybrid features, such as start-stop engines, penetrate into conventional vehicles. BEV share could be around 5%				
2017	Carbon Tracker	Expect the Unexpected: The Disruptive Power of Low-carbon Technology	In scenarios applying our lower-cost assumptions, in which EVs achieve cost parity with conventional internal combustion engine vehicles (ICEs) by 2020, EVs take a 19-21% share of the road transport market over the subsequent ten years. To put this in perspective, BP's 2017 energy outlook sees EVs only commanding a 6% (100 million vehicles) share of the market five years later than this in 2035. Along with	This cost projection is credible given that most studies believe EVs will be cost competitive with ICEs when battery costs are between $150-300kWh and Tesla already claims that batteries will cost as little as US$100/kWh by 2020. By 2050, the EV should cost around 20,000 to 30,000 $/vehicle			1.1 billion EVs in the global vehicle fleet by 2040, compared to 150 million in the IEA NPS

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			the emergence of hydrogen fuel and more efficient ICEs with an on-board battery ('oil hybrids'), lower-cost EVs contribute to ICEs losing market share to 45%/46% by 2030. EVs occupy over half the road transport market in 2040 and ICEs just a fifth. By 2050, BEVs have saturated the passenger vehicle fleet, which accounts for 69% of the road transport market. ICEs now account for just 12%/13% of vehicles, almost exclusively due to demand in medium-duty vehicles and commercial trucks				
2017	Roland Berger	E-mobility Index Q1/2017					Market watcher report on industry, technology and EV market for China, France, Germany, Italy, Japan, Korea and USA.
2016	Cycling Industry News	Electric Bikes Worldwide Report	200 Million Electric Bicycles Ridden Today–Poised to Grow to 2 Billion by 2050				
2016	IDB	The incorporation of electric cars in Latin America	Frost & Sullivan (2015) estimate the market size of these six countries to 2023. According to their estimation, annual sales of PEVs in these six countries could range between 52,000 and 220.000 units in 2023, depending on regulatory changes, consumer acceptance and technology development5. This represents a market	Price premiums that range between 10% and 30% for HEVs, 50% to 80% for PHEVs and 80% to 150% for BEVs. The difference for the HEV ranges from 6,5% in Mexico to 26,4% in Peru (roughly USD 2.300 and USD 12.000 respectively), with the exception of Argentina, where the difference is remarkably high (172% or USD 88.000)12. The difference for the BEV ranges from 55% in	The current cost of lithium-ion batteries for BEVs is approximately USD 400 per kWh and cost projections point to USD 200 to 250 by 2030 and USD 150 to 160 by 2050. The battery cost for PHEVs is likely to be USD 60 to 70 per kWh higher than for BEVs		The estimated emissions in terms of gCO2 per kWh are 165,3 for Brazil, 231,1 for Colombia, 364,9 for Peru, 425 for Argentina, 459,6 for Chile and 471,7 in Mexico.

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			penetration between 0.3% and 2,5%.	Mexico to 87% in Peru (roughly USD 19.000 and USD 35.000 respectively), again with the exception of Argentina, where the difference is 320% (USD 163.000).			
2016	Marco Miotti, Geoffrey J. Supran, Ella J. Kim and Jessika E. Trancik	Personal Vehicles Evaluated against Climate Change Mitigation Targets	The 2050 target is likely to require a virtually ICEV-free fleet consisting almost entirely of BEVs and PHEVs	From lifecycle perspective, our results show that consumers are not required to pay more for a low-carbon-emitting vehicle. Across the diverse set of vehicle models and powertrain technologies examined, a clean vehicle is usually a low-cost vehicle			An all-electric fleet would increase 2050 electricity consumption in the U.S. by an estimated 1315 TWh per year, or about 28%
2016	The European Consumer Organization	'Low carbon cars in the 2020s: Consumer impacts and EU policy implications' (Element Energy, Europe)		Between 2020 and 2030 the costs associated with buying and running a conventional and alternatively powered car will converge. Electric cars will fall in price rapidly between 2020 and 2030 By 2020, the difference in cost is expected to fall to 4% before narrowing further to around 1.5% by 2025 and ending up at less than a 0.5% gap by the end of the 2020s. This gap equates to a difference of around €100 by 2030, representing a remarkable fall from just under €2,000 in 2015. To put this €100 cost difference into context, it should be recognised that the range of electric vehicles should also increase from 200km to 320km.	A replacement battery for a 2020 C Segment electric car is predicted to cost upward of €5,000		

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2016	BP	Back to the future: electric vehicles and oil demand	Global Electric Car Fleet to grow to 26 million by 2025 and 71 million by 2035 accounting for a little under a tenth of the total increase in the global car fleet.				In the IEA 450 scenario, the stock of EVs is presumed to reach around 450 million by 2035, some 380 million vehicles more than we envisage in our Outlook, with EVs accounting for half of the total increase in passenger vehicles over the next 20 years. In BP's 2016 Energy Outlook, we assumed a roughly even split between BEVs and PHEVs. EVs not likely to act as a major disrupter to oil demand over the next 20 years
2016	OPEC	World Oil Outlook	By 2040, hybrids (both HEV and PHEV) are anticipated to represent 28% of total passenger car sales in OECD Europe, ~26% in OECD America, 31% in OECD Asia Oceania, 19% in China, ~15% in developing countries, ~18% in China, 8% in India, 16% in Eurasia. BEVs rate's of total passenger car sales: 21% in OECD America, 19% OECD Asia Oceania ~15% in OECD Europe, ~4% in developing countries, ~15%		expected $150/kWh by the early 2020s		

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			in China, ~6% in India and ~5% in Eurasia. 266 million EVs in 2040 (125 million PHEVs, 141 million BEVs) will be part of passenger car fleet; 15 million PHEVs and BEVs				
2016	ICCT and ZEV Alliance	Assessment of next-generation EV technologies, and Evolution of incentives	2.3 million annual global vehicle sales by 2020 (3% of global vehicle sales). 4 million annual global sales per year 2023 (5% of global vehicle sales).	EVs cost-competitive for first vehicle owner (including fuel saving for five years) in 2020-2025 timeframe, depending on electric vehicle range, vehicle market, gas price	$140/kWh battery pack level cost in 2023 ($175/kWh for lower volume companies)		
2016	WWF	No Middle Road - The growth of electric vehicles and their impact on oil	Base projections for China – by 2040- 100% of sales, Optimistic projections for China- by 2035,100% of sales. Pessimistic projections for China – by 2045, 100% sales	EVs to become a cost competitive alternative to ICE vehicles in the mid-2020s.	Tesla forecasting that its batteries will cost US$100/kWh by 2020		If we assume that EVs consume, on average, 0.3 kWh of electricity per mile travelled and that each EV travels 10,000 miles a year, our EV sales forecasts for China suggest that by 2050, the incremental power demand will be 914 to 1,079 TWh a year
2015	Goldman Sachs	A growing Low Carbon Economy	Grid connected vehicles (electric vehicles and plug-in hybrids) grow from c.$12 bn in sales in 2015 to $88 bn by 2020 and $244 bn by 2025 i.e. 22% of market share amounting to almost 25 million vehicles. Hybrids will account for the lion's share of sales.		The battery range for lower performance EVs to increase by over 70%, while battery costs are expected to fall by more than 60% over the next five years		
2015	ICCT and ZEV Alliance	Global climate change mitigation potential from a transition to electric vehicles	30 million cumulative electric vehicles by 2025 (10-15% electric vehicle share in leading markets).				

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2015	OPEC	World Oil Outlook	The share of hybrid electric cars is projected to grow from 1% to 14% in the period 2013–2040. BEVs are not expected to gain significant market share due to initial purchase price and convenience issues.				
2015	Björn Nykvist and Måns Nilsson	Rapidly falling costs of battery packs for electric vehicles		At US$150 per kWh, BEVs are commonly understood as becoming cost competitive with internal combustion vehicle. International Energy Agency (IEA) estimates that parity with internal combustion cars in general is reached at US$300 per kWh	We show that industry-wide cost estimates declined by approximately 14% annually between 2007 and 2014, from above US$1,000 per kWh to around US$410 per kWh, and that the cost of battery packs used by market-leading BEV manufacturers are even lower, at US$300 per kWh, and has declined by 8% annually. Learning rate, the cost reduction following a cumulative doubling of production, is found to be between 6 and 9%, in line with earlier studies on vehicle battery technology. We reveal that the costs of Li-ion battery packs continue to decline and that the costs among market leaders are much lower than previously reported. There is a convergence of estimates of battery cost for the		

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					whole industry and costs for market-leading car manufacturers in 2017–2018 at around US$230 per kWh		
2014	Argonne National Laboratory	Vehicle Technologies Program Government Performance and Results Act (GPRA) Report for Fiscal Year 2015 (ANL-US)	Battery Electric Vehicle penetration to reach 0.4% to 3.2% by 2050 (with or without program) Hybrid electric vehicle penetration to reach 66% to 77%. Medium- and Heavy-Duty Truck Market Penetration estimates range from 8% to 24% by 2050				
2014	Accenture	The Electric Vehicle Challenge	EVs are projected to become 10 to 15 percent of the global auto market by 2020 from a current base of ca. 0.2 percent. In Europe, the market share of EVs including BEVs, PHEVs, and E-REVs, is expected to represent the lion's share of the market by 2040 in terms of drive technologies compared to internal combustion engines (ICE), fuel cells, and other alternative fuels				In the Accenture, global study of over 7,000 people in 13 countries" Plug-in electric vehicles: Changing perceptions, hedging bets," 60 percent of those respondents who intend to purchase a car within the next decade say that they will probably or certainly consider EVs as an option. This includes both plug-in hybrid electric vehicles and full-electric models.
2014	McKinsey	Electric vehicles in Europe: Gearing up for a new phase?	76% of vehicle sales could be electric in 2030 with a strong regulatory push. However, with inadequate regulatory support, the	Currently, estimates for difference in the TCO of EV compared to ICE vehicles vary widely, from ~EUR 5,000 to 20,000 per vehicle (for annual mileage of 20,000 km and a	In the near term (towards 2015), battery costs (large format Li-ion battery packs) are expected to go down to ~USD 350-500/kWh. The	The Costs for the large-scale deployment of charging infrastructure in Europe are too	The number of EV model launches doubled in 2013 compared to 2012, and is projected to grow by 50% in 2014.

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			electric vehicles could constitute 48% share	holding period of four years), depending on powertrain type, model, and country, as well as fuel price and other variables.	main long-term drop, however, will come from technology evolution. The commercial scale introduction of the layered-layer cathode with a Si-anode, for example, could bring prices down to less than under USD 200 by 2020.	significant to be borne by public sector alone (one slow two-plug charging station costs ~EUR 2,000 in hardware alone, two charges per vehicle required)	
2013	IEA	Global EV Outlook 2013	2DS - three-fourths of all vehicle sales by 2050 would need to be plug-in electric of some type	For Price parity with ICE, IEA suggests 300 $/kWh by 2020	Price per usable kilowatt hour of a lithium-ion battery ranges between USD 500-650 and thus makes up a large portion of a vehicle's cost, depending on the size of the battery pack.According to the U.S. Department of Energy (U.S. DOE), battery costs based on development efforts have gone from USD 1,000 per kilowatt hour (kWh) in 2008 to USD 485/kWh of usable energy at the end of 2012. IEA estimates a learning rate of 9.5% which describes the reduction in cost of batteries through economies of scale.		
2011	Google	The Impact of Clean Energy Innovation	EV, PHEV and HEV LDV's could constitute 58% of LDV's by 2030	Gasoline costs of $3.50/gal., breakeven TCO is reached at battery costs of ~$255/kWh for a 125-mile range BEV, while at $5/gal., breakeven TCO is reached at ~$355/kWh	Average battery costs could reduce to ($/Vehicle) 8000 by 2020, 5000 by 2030, 4308 by 2040 and 4000 by 2050. The battery energy Capacity Cost ($/kWh)		

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			Sales/Fleet Penetration Dimension	Price Parity	Battery Costs/ Battery Capacity	Charging Infrastructure	
					could reduce from 500 (2010) to 200 (2020), 100 (2030), 80 (2040), 70 (2050). The Energy Density (Wh/kg) increases from 100 (2010) to 300 (2020), 400 (2030) and 500 (2050)		
2010	European Commission Joint Research Centre Institute for Prospective Technological Studies	Plug-in Hybrid and Battery Electric Vehicles- Market penetration scenarios of electric drive vehicles	The deployment of pure electric cars is expected to remain very limited at least until 2020. The access to charging infrastructures at home, in working and urban public places will be the first barrier to a large-scale market development of electric cars. This holds true both in the near and longer term. Faster market penetration would be achieved in the case of PHEVs as soon as they are commercialised (~2020). A voluntarist development of standards and charging infrastructure would contribute to doubling the market penetration of both BEVs and PHEVs by 2030 compared with what would happen under a much more limited development. By 2020, 5.5 to 14% share. By 2030, 15% to 62% share		Typical densities are currently around 140 Wh/kg and 730 W/kg. While current price is in a range 700-1000 $/kWh, costs as low as 300-400 are seen achievable by 2020.		In the Batt1 scenario, technical progress is slow and limited to a better durability while the usable SOC window remains unchanged. A continuous cost reduction is assumed, up to ~300 €/kWh. In the Batt2 scenario, progress is faster and more radical (200 €/kWh by 2030)

Year	Author	Title	Findings				Remarks/Key Assumptions
			Sales/Fleet Penetration Dimension	Price Parity	Battery Costs/ Battery Capacity	Charging Infrastructure	
2010	Boston Consulting Group	Batteries for Electric Cars	Fully electric vehicles as convenient as ICE-based cars are unlikely to be available for the mass market by 2020.	To reach price parity in US by 2020, three important conditions (in full or some combination with less degree) – 300$ per Barrel, 200% increase in gasoline prices due to higher oil price or increased tax or both and $7500 in governmental incentives available per car.	Battery cells today can reach nominal energy density of 140 to 170 watt-hours per kg, compared with 13000 Wh/kg. Even if energy density were to double in the next 10 years, battery packs would still store only about 200 Wh/kg of weight. Assuming 250 kg, 20-25% of total weight of small cars, doubling of energy density would give a range of about 300km. Considerable challenges to reach battery costs of $250 per kWh by 2020.	Infrastructure charging costs at 2020 to be $ 20 billion	
2010	J.D. Power and Associates	Drive Green 2020: More Hope than Reality?	By 2020, 5.2 million units (7.3% of the total) will feature some type of battery-powered configuration. The United States is forecasted to account for 53% of the global HEV total, followed by Japan (20%) and Europe (16%), while the remaining 11% will be spread among all other countries. On a regional basis, Europe is expected to account for 56% of BEV sales by 2020, followed by China (25%), the United States (8%), and Japan (5%).	Compared with a traditional compact vehicle powered by an internal combustion engine (ICE), a comparably sized HEV is typically priced 30%-40% higher, and a BEV is priced 50%-100% higher (depending on the subsidies received)	A Li-ion battery, for example, is expected to have a useful life of up to 200,000 km (124,000 miles), and the cost to replace the battery pack is expected to range from US $10,000 to US $15,000		More than 30 global vehicle automakers are expected to be manufacturing and selling BEVs by 2020, but only one—the Renault-Nissan Group—is expected to have more than a double-digit share of the global BEV market by that time. Renault-Nissan is forecasted to account for 34% of all BEV sales by 2020, followed by the PSA Group (6.1%) and the Volkswagen Group (6.0%)
2010	HIS Global Insight	Battery Electric and Plug-in Hybrid Vehicles: The Definitive	Business-as-Expected: PHEV Share 8.6% BEV Share 9.9% Cornutopia:	By 2030, with all of this third party assistance (from governments, utilities, employers, etc.) it is expected that the urban transport sector			

Year	Author	Title	Findings				Remarks/Key Assumptions
			Sales/Fleet Penetration Dimension	Price Parity	Battery Costs/ Battery Capacity	Charging Infrastructure	
		Assessment of the Business Case	PHEV Share 31.3% BEV Share 29.2% Disruptive: PHEV Share 21.6% BEV Share 30.0%	can be largely converted to BEVs			
2009	Boston Consulting Group	The Comeback of Electric Car	BEV share to 3% to 10%, Range extender EV to be 3% to 6% and Hybrid electric vehicle share to be 20% to 26% by 2020 (share of new sales)	At the battery cost of 700$ per kWh, the electric car costs more than advanced ICE vehicles and hybrids when oil prices are below $ 280 per barrel. Only if the battery costs drops low, to $500 per kWh, will the electric vehicle become attractive at an oil price between $100 and $120 per barrel	500$ to 700$/kWh by 2020		
2009	Transport and Environment	How to avoid an electric shock Electric cars: from hype to reality	it usually takes 10 to 20 years to achieve 5% of new sales. Most scenarios even think it unlikely that electric vehicles will number more than 25% of new sales by 2050. Faster market penetration would require a combination of competitive technologies and strong policy incentives or regulations.	The cost and range factors outlined are likely to persist until 2030. As such, without a dramatic shift in consumer expectations, the electric vehicle is likely to remain a niche vehicle (Kromer and Haywood 2007: 90).	Graph 15 shows that, in the decade 1991-2001, the cost of lithium ion batteries decreased substantially, while capacity increased. However, battery prices are still unlikely to fall sufficiently in the medium term to enable pure EVs to compete with conventionally-powered vehicles.		
2009	EUCAR	The Electrification of the Vehicle and the Urban Transport System			A cost less than 150 €/kWh has to be achieved in 2020 (300 €/kWh in 2015) for a widespread dissemination of EVs		Even if a lot of progress has occurred in terms of energy content related to volume and weight of a modern battery, these characteristics remain about hundred times lower than that of fuels for

Year	Author	Title	Findings				Remarks/Key Assumptions
			Sales/Fleet Penetration Dimension	Price Parity	Battery Costs/ Battery Capacity	Charging Infrastructure	
					Energy density has to be improved at least to 200 Wh/kg in 2020 (150 Wh/kg in 2015). Current technologies achieve below 100 Wh/kg		combustion engines. This fact is one of the main challenges for electric mobility, as it influences both costs and usability. For this reason, the Battery Electric Vehicle (BEV) will mainly be used for urban and near-urban transportation.
2008	IEA	ETP-2008	ACT Map - Beginning in 2020, electric vehicles reach 20% of travel on electricity by 2050 (LDV's) to Blue EV success scenario with 90% of LDV sales by 2050				130 Mtoe of electricity (ACT Map) to 650 Mtoe (Blue EV success scenario). Electric vehicles are assumed to penetrate at 5 to 10 years lag in non-OECD countries when compared with OECD countries.
2008	Deutsche Bank	Electric Cars: Plugged In	We project hybridized/electric vehicles will represent 20% of new vehicle sales in the U.S. (slightly above NHTSA's 20% estimate) and 50% of Western European sales (in line with Roland Berger and JD Power estimates). By 2020, we estimate penetration rates could increase to 49% in the U.S. and 65% in Europe.	Over time, we believe the switch to lithium technology will reduce the cost of the battery to approximately $500 per kWh and additional volume should reduce other costs to approximately $1000 per unit. This would reduce the payback to approximately 3 years. However, the lighter weight and smaller size of lithium ion batteries could allow automakers to install a more powerful battery, thereby increasing fuel economy. We believe a 2 kWh battery could improve fuel economy to 65mpg for $700 of additional cost which would further improve the payback to 2.8 years. We believe the current payback of PHEVs and EVs of 7.4 years and 8.1 years	Following cost per lithium ion battery: mild hybrid $500 (1kWh), full hybrid $1000 (2 kWh), PHEV $6,000 (12kWh) and EV $11,000 (22 kWh).		

Year	Author	Title	Findings				Remarks/Key Assumptions
			Sales/Fleet Penetration Dimension	Price Parity	Battery Costs/ Battery Capacity	Charging Infrastructure	
				remains too high for these technologies to dominate the U.S. market at current gasoline prices, without other incentives, or new business models			
2006	Arthur D. Little	Market and Technology Study – Automotive Power Electronics 2015	In the view of European manufacturers up to 2030 the car market will be characterised by 83% domination of conventional gasoline and diesel propulsion technology. The remaining 17% market segment will be divided between alternative forms of propulsion. The hybrid drive will take over market leadership with 15%. The residual 2% will be covered by vehicles using fuel cell technology.				The hybrid share of the car market will rise to 2.8 million in 2011 and increase to 6 million by 2015

E-mobility Targets by Countries, Cities and Companies

Policy plans by countries and cities can work as catalysts towards e-mobility. From January to July 2017 alone, 16 policy announcements were recorded, more than in any previous year. The overview below indicates that the ambition level has increased over time, and in 2017 some of the most progressive announcements have been made.

Leading examples in 2017 are France and India with statements to end sales of internal combustion engines 2030 and 2040 respectively. In 2016, the Netherlands announced plans to ban vehicles with internal combustion engines by 2025. The latest example of fuel-powered vehicle ban is the UK with the goal to ban diesel and gasoline car sales from 2040.

Other countries have set targets for absolute number or overall share of electric vehicles by a certain year. 2020 is a major target year, with Spain aiming for 2.5 million electric vehicles, Germany and India aiming for 1 million, Portugal targeting 750,000 and South Korea aiming for 200,000 electric cars. Country targets for 2030 include Finland's goal of 250,000 electric vehicles, Malaysia aiming for 100,000 electric cars, and South Africa's targeting a 20% share of electric cars. Norway is a leading country in terms of e-mobility thanks to financial incentives.

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Numerous cities are following similar bold actions as taken by national governments. For instance, by 2030, Seattle aims for a 30% share for electric vehicles, and Dubai is targeting a 10% share. Hong Kong wants to replace all conventional buses with zero emission buses. An outstanding example is London, which plans for a zero-emission transport system by 2050.

A leading company in the field of e-mobility is Deutsche Post DHL, which has set a long-term goal to reduce all logistics-related emissions to zero by 2050 through its Go Green Program, in which electric mobility is poised to play a major role.

Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Country								
China	September 2017	• China considers to phase out diesel and petrol cars • China builds world's largest EV charging network with 167,000 stations					✓	✓
	2015	• NEVs will reach 5% of the total vehicle market demand by 2020, and 20% by 2025, China issued the "Electric vehicle charging infrastructure development guide (2015-2020)" targeting 12,000 new centralized charging and switch station and >4.8 million charging spots (accommodating for needs of 5M NEVs by 2020). • The country's future roadmap of new-car sales projects 7 million ZEVs by the year 2025	✓				✓	✓
Scotland	September 2017	• Scotland to ban sales of fossil fuel-powered vehicles by 2032 • 40% of car sales by 2032 to be EVs and other low emission vehicles					✓	
	June 2009	Almost complete decarbonisation of road transport by 2050 with significant progress by 2030 through wholesale adoption of electric cars and vans, and significant decarbonisation of rail by 2050	✓			✓		
Georgia	July 2017	€5.5 million sovereign loan to Georgia to be on-lent to the City of Batumi to acquire 10 battery-electric buses		✓				

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Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Ireland	July 2017	Ireland wants to electrify all vehicles (cars and vans) by 2030	✓					
	January 2013	350,000 electric vehicles and 2,000 publicly accessible infrastructure stations by 2020						✓
	2011	By 2020 the EV contribution to the passenger car segment is 10%, growing to 60% by 2050 in the medium scenario	✓					✓
France	July 2017	The French government has set out an ambitious goal for no more petrol or diesel cars to be sold in the country by 2040.	✓					
	November 2015	7 million charging points for plug-in hybrid and electric vehicles by 2030						✓
	January 2013	97000 publicly accessible infrastructure stations by 2020						✓
	October 2009	France in 2009 had established 2 million by 2020 target						
India	May 2017	Every car sold in India from 2030 will be electric	✓					
	2013	The 2020 target: 2W - 5 million vehicles, 3W - 30,000, 4W - 1 million vehicles, LCV - 50,000, Buses - 30,000 = Total 5 to 7 million vehicles	✓	✓	✓	✓		
UK	July 2017 June 2017	• New diesel and petrol cars and vans to be banned from 2040 in UK • 60% of new cars and vans to be electric vehicles by 2030. • 100% of new cars electric by 2040. • The United Kingdom established a target of 1.55 million vehicles by 2020. € 300 million will be devoted to promoting electric cars between 2009 and 2014.	✓	✓				
	January 2013	1,550,000 electric vehicles and 122,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)	✓					✓
Poland	September 2017	By 2025, there will be a million electric cars on polish roads, as well as introducing the concept of electrification of public transport.	✓	✓				
	January 2013	46,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓

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Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Costa Rica	June 2017	Preparing bill to ban import of fossil fuel cars by 2030	✓					
	November 2015	greater use of electric transportation, both public and private	✓	✓				
United Arab Emirates	May 2017	10 per cent of car fleets of federal ministries and agencies to be electric vehicles, long-term plan aims for up to 20 per cent of government fleets to have electric vehicles	✓					
Chile	2016	Target to electrify 25% of public transport bus fleet in the capital Santiago by 2025 (National Climate Action Plan 2017-2022)		✓				
New Zealand	May 2016	A goal of reaching approximately 64,000 electric vehicles on our roads by the end of 2021					✓	
Norway	September 2016	Differentiated purchase and use taxes on vehicles are essential for a quick introduction of zero-emission vehicles and plug-in hybrids. Shoreside electric power and electric charging power is to be available in ports where traffic and ship types provide a great potential for emission cuts, both in order to reduce greenhouse gas emissions and local air pollution while at berth, and to make hybrid solutions a viable option for ships. Within rail transport diesel is to be replaced by carbon-neutral fuels or low- and zero-emission technology. After 2025, all new light vehicles, new city buses and new light commercial vans should be ZEVs. By 2030, all new heavy commercial vans, 75 percent of new long-distance buses and 50 percent of new lorries should be ZEVs. By 2030, distribution of goods should take place almost without emissions in the largest city areas in line with the EU's White Paper on transport	✓	✓	✓	✓		
Germany	July 2017	• 1,000 new EV charging stations on German Autobahn by 2020						✓
	October 2016	• Only zero-emission passenger vehicles will be approved" for use in 2030. • One million electric cars on German roads by 2020. • Make all passenger vehicles sales ZEVs by no later than 2050	✓				✓	

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Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
	January 2013	150,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
	January 2009	Germany has set itself a battery density by volume level of 280 to 300 Wh/l by 2025					✓	
Thailand	March 2016	The goal for Thailand is to get 1.2 million electric vehicles and build 690 charging stations on its roads by 2036					✓	✓
Singapore	June 2016	1,000 electric cars will be rolled out across Singapore, powered by 2,000 charging points by 2020	✓					✓
Netherlands	April 2016	Netherlands moots electric car future with petrol and diesel ban by 2025	✓					
	2015	75,000 privately owned electric vehicles on the country's roads by 2020, and 50% of all new cars sales plug-in electric—with at least 30% of these vehicles fully electric—by 2025	✓					
	January 2013	200,000 electric vehicles and 32,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
	July 2009	65 million euros to make "the Netherlands the guide and international laboratory for electric driving"					✓	
Belarus	June 2016	At least 10,000 electric vehicles in Belarus by 2025	✓					
Azerbaijan	November 2015	Enhance the use of electric vehicles at public transportation		✓				
Cabo Verde	May 2015	Making government vehicles electrically powered by 2030.					✓	
Cambodia	November 2015	Increase use of hybrid cars and electric vehicles	✓					
Colombia	2015	96 vehicles using electricity	✓	✓				
Dominica	September 2015	government vehicles to be replaced by hybrids vehicles	✓					
Ecuador	February 2015	Government plans to promote electric mobility					✓	
Indonesia	August 2017	Indonesia to introduce tax breaks for low-carbon cars to achieve 29% less emissions by 2030	✓					

Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
	October 2015	Electric vehicle and hybrid, each 1% and 5% share in 2050					✓	
Jordan	September 2015	Introduce electric cars and build 3,000 charging stations over the next ten years						✓
Malaysia	October 2015	By 2030, 100,000 electric cars, 100,000 electric motorcycles on the road, along with 2,000 electric buses and 125,000 charging stations in the country	✓	✓		✓		✓
Marshall Islands	July 2015	Introduction of electric vehicles	✓					
Mongolia	November 2015	Increase the share of private hybrid road vehicles from approximately 6.5% in 2014 to approximately 13% by 2030	✓					
Seychelles	November 2015	More use of electric vehicles charged with renewable energy technology	✓					
South Africa	April 2017 November 2015	• Country will have more than 2.9-million electric cars on the road by 2050, with R6.5-trillion invested in the industry over the next four decades. • Target 20% hybrid-electric vehicles by 2030.	✓					
Sri Lanka	April 2015	10% of vehicle fleet to be electric by 2020	✓					
Mali	2015	Replace more than one-third of fossil fuels (with renewables) for transport by 2030					✓	
Netherlands	2015	75,000 privately owned electric vehicles on the country's roads by 2020, and 50% of all new cars sales plug-in electric—with at least 30% of these vehicles fully electric—by 2025	✓					
	January 2013	200,000 electric vehicles and 32,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
	July 2009	65 million euros to make "the Netherlands the guide and international laboratory for electric driving"					✓	
Bhutan	November 2014	Bhutan is a 70 percent reduction in fossil fuel imports by 2020 & enhance market share of EV substantially in 5 years					✓	
Brunei Darussalam	December 2014	White paper on Land Transport considering zero-emission electric vehicles, electric buses	✓	✓				
Philippines	March 2014	• Bill promoting Electric Vehicle and Hybrids which has been under the Senate since 2014					✓	

Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
		• Electric Vehicle Association of the Philippines (EVAP) aspires for the establishment of a national development program for EVs						
South Korea	December 2014	The government will strive to boost the number of battery-powered cars on the road from the current 800 to 3,000 in 2015 and 200,000 in 2020 and diversify the portfolio to taxis, buses and trucks. The initial target was 1 million vehicles by 2020.	✓	✓	✓			
Austria	January 2013	250,000 electric vehicles and 12,000 publicly accessible infrastructure stations by 2020. 5% share of all registered passenger vehicles.					✓	✓
Belgium	January 2013	21,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Bulgaria	January 2013	7,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Canada	October 2013	Highway 401 (900 km) electrified with 20 public charging stations						✓
Cyprus	January 2013	2,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Czech Republic	January 2013	13,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Denmark	January 2013	200,000 electric vehicles and 5,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)					✓	✓
Estonia	January 2013	• 1,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station) • World's first nationwide network of fast chargers (165 quick charging stations)						✓
Greece	January 2013	13,000 publicly accessible infrastructure stations by 2020						✓
Finland	November 2016	250 000 electric vehicles by 2030 (street or parking lot charging station)					✓	
	January 2013	7,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Hungary	January 2013	7,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓

Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Italy	January 2013	125,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Lithuania	January 2013	4,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Luxembourg	January 2013	40,000 electric vehicles and 1000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)					✓	✓
Latvia	January 2013	2,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Malta	January 2013	1,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Portugal	July 2017	Portugal will soon be fully covered by electric car charging stations, one in each municipality						✓
	January 2013	200,000 electric vehicles and 12,000 publicly accessible infrastructure stations by 2020						✓
	2009	The Portuguese State also committed to play an educational role and defined that EV's will have a 20% share of the annual renewal of the public car fleet, starting in 2011. It is estimated approximately 130,000 EVs will in circulation in Portugal by 2015 and 750,000 by 2020.					✓	
Romania	January 2013	10,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)						✓
Spain	January 2013	2,500,000 electric vehicles and 82000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)					✓	✓
	January 2013	Spain established a target of 250,000 BEVs and PHEVs by 2014 and 2.5 million EVs by 2020					✓	
Slovakia	September 2016	Slovakia's target is for 31 per cent of all new vehicles in the country to be electric by 2030. The Ministry plans in the future to build one charging station for every 10 EVs.	✓					
	January 2013	4,000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)					✓	✓
Slovenia	January 2013	14,000 electric vehicles and 3000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)					✓	✓
Sweden	January 2013	600,000 electric vehicles and 14000 publicly accessible infrastructure stations by 2020 (street or parking lot charging station)					✓	✓

Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Viet Nam	August 2013	100,000 electric cars as part of 6 million environmentally-friendly vehicles by 2020	✓					
EU	March 2011	Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO2-free city logistics in major urban centres by 2030	✓		✓			
Antigua and Barbuda	August 2011	Strategic Intent for support of hybrid, flex-fuel or electric vehicles					✓	
United States of America	February 2011	One million electric vehicles on the road by 2015		✓			✓	
Japan	June 2017 June 2013 2010	• To increase the share of electric vehicles and plug-in hybrid vehicles to between 20 and 30 percent and also the share of fuel cell vehicles up to 3 percent among total new passenger vehicle sales by 2030. • To develop technologies to produce battery packs whose energy density stands at 250Wh/kg and output density at 1500W/kg for EVs; and energy density at 200Wh/kg and output density at 2500W/kg for PHEVs; and the cost at ¥20,000/kWh for both in the year 2020. • 20% sales by 2020 and Charging station target of 2 million (normal) and 5000 (fast)	✓	✓			✓	✓
City/Sub-National								
Vermont	September 2017	To receive two electric buses as part of federal grant		✓				
Utrecht	September 2017	• Utrecht introducing electric buses		✓				
Beijing	October 2017 February 2017 November 2016	• Study shows that without technological breakthrough andx policies EVs will have market share of 7% by 2030, with new technology and supporting policies 70% of new vehicle sales will be electric, 50% of vehicle stock will be electric by 2030 • All newly added or replaced taxies in the city of Beijing will be converted from gasoline to electricity.	✓				✓	✓

Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
		• Beijing plans to install 435,000 charging stations between 2016 and 2020						
Bridgetown	September 2017	Bridgetown, the capital of Barbados, introduced solar-powered electric vehicle	✓					
Los Angeles	July 2017 March 2017	• Move to 2,300 electric buses for emission-free public transport fleet by 2030		✓				
		• Increase the percentage of electric and zero emission vehicles in the city to 10% in 2025 and 25% in 2035					✓	
London	June 2017	• 1500 electric vehicle charging points to be installed across London • The Mayor's aims are for all taxis and Private Hire Vehicles (PHVs) to be zero emission capable by 2033, for all buses to be zero emission by 2037, for all new road vehicles driven in London to be zero emission by 2040, and for London's entire transport system to be zero emission by 2050.	✓	✓	✓	✓		✓
Oxford	August 2017	• 100 electric vehicle charging points in "first on-street charging pilot of its size in the world" beginning in 2017						✓
Quebec	January 2017 April 2016 December 2015	• Starting with the 2018 model year, 3.5 per cent of all auto sales in the province will have to be from those types of vehicles. That threshold will rise to 15.5 per cent for 2025 models. • Quebec sets target of 100,000 electric and plug-in hybrids by 2020 • Make all passenger vehicles sales ZEVs by no later than 2050					✓	

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Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Queensland	July 2017	Queensland will have a 2,000km network with 18 electric vehicle charging stations	✓					✓
New York	April 2017	20% of the motor vehicles sold for use in New York City to be electric by 2025, up from less than 1% today					✓	
Hong Kong	April 2017	The ultimate objective of the Government is to have zero emission buses running across the territory.		✓				
Dubai	January 2017	A 10 per cent share for hybrid and electric vehicles among all new cars purchased between 2016 and 2020. It also targets that 2 per cent of all cars in Dubai will be either electric or hybrid vehicles by 2020 and it will reach 10 per cent by 2030	✓					
San Francisco	April 2017	Starting January 2018, the ordinance requires new residential, commercial, and municipal buildings to have sufficient electrical infrastructure to simultaneously charge vehicles in 20% of parking spaces.					✓	
Amsterdam	September 2016	The target is to become a zero emissions city by 2025, with opportunities for everyone to adopt electric transport.						
Belgrade	September 2016	Purchase of electric buses		✓				
Seattle	September 2016	30% of all light-duty vehicles in Seattle operate under electric power by the year 2030	✓				✓	
Montreal	June 2016	10-point plan, among are converting municipal fleet to electric until 2020, electrify public transport (purchase only electric by 2025, set up 1000 charging stations by 2020	✓	✓				✓
Vancouver	November 2016	Approximately 70 per cent of light-duty vehicles will plug into an external power source in 2050	✓					
California	January 2017 October 2016 December 2015	• over 4 million zero-emission vehicles by 2030 • An updated roadmap toward 1.5 million zero-emission vehicles on California roadways by 2025 • Make all passenger vehicles sales ZEVs by no later than 2050	✓	✓				
US states (Connecticut, Maryland, Massachusetts, New York,	December 2015 May 2014	• Make all passenger vehicles sales ZEVs by no later than 2050	✓	✓			✓	

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Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Oregon, Rhode Island, Vermont)		• Commit to 1.8 million zero-emission vehicles by 2025 (3.3 million including California).						
US States (Washington, Oregon, California)	2016	West Coast Electric Highway with thousands of fast-charging stations						✓
Portland	June 2015	• Electric vehicles will displace 10 percent of all miles driven by 2030 and an additional 15 percent of all miles driven by 2050. • An estimated 50,000 electric vehicles in the metro area					✓	
British Columbia	December 2015	Make all passenger vehicles sales ZEVs by no later than 2050	✓	✓				
Washington	December 2015 February 2015	• 20 percent of new vehicles electric by 2017 • 50,000 Plug-In Electric Vehicles by 2020					✓	
Copenhagen	July 2017	Copenhagen to procure only electric buses from 2019		✓				
	September 2012	By 2025, public transport is carbon neutral, 20-30% LDVs and 30 to 40% HDV's use low carbon fuel (including electric)	✓	✓	✓			
Stockholm	May 2011	Ambition to be one of the world's leading clean vehicle cities by 2030 with electric vehicles playing important role in this transformation.					✓	
Jeju	May 2012	• 371,000 electric cars and 225,000 rechargers will be available across the island by 2030 • All its vehicles to be electric by 2030	✓				✓	
Seoul	January 2011	Seoul's Bus Fleet Plans to Turn Half Electric by 2020 and 120,000 EVs on Seoul streets by 2020		✓			✓	
Illinois	2009	By July 1, 2015, at least 20% of new passenger vehicles purchased must be hybrid electric vehicles (HEVs) and 5% must be battery electric vehicles (EVs); and by July 1, 2025, at least 60% of new passenger vehicles purchased must be HEVs and 15% must be EVs.					✓	

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Title	Announcement Date	Description	Modes					Charging Infrastructure
			Car/Taxi	Bus	Trucks	Others	No Mention/All	
Companies								
Shenzhen Bus Company	June 2016	Shenzhen Targets to Go 100% Electric Buses by 2017		✓				
DHL	September 2017 March 2017	Member of EV100 To reduce all logistics-related emissions to zero by the year 2050.One of the key actions under this strategy is reduce local air pollution emissions by operating 70% of our own first and last mile services with clean pick-up and delivery solutions, such as bicycles and electric vehicles by 2025			✓	✓		
Lyft	July 2017	By 2025, Lyft's shared platform will provide at least 1 billion rides per year using electric autonomous vehicles.	✓					
Baidu	September 2017	Member of EV100, committing to transition its own fleets to EV as well as enabling staff to use electrified transport	✓	✓				
Heathrow Airport	September 2017	Zero-carbon airport by 2050,						
HP INC.	September 2017	Charging stations for employees in several countries						✓
IKEA	September 2017	EV charging stations at stores and planned transition of delivery vehicles to all electric fleet			✓			✓
LEASEPLAN	September 2017	Leasing company recommending customers to use electric vehicles and transforming own vehicle fleet					✓	
Metro AG	September 2017	Charging stations at stores and company car fleet to be electrified					✓	✓
Pacific Gas and Oil Company	September 2017	1,600 electric-based vehicles, including a pioneering hybrid-electric bucket truck, program to install 7,500 level 2 EV charging stations at multi-family dwellings and workplaces					✓	✓
Unilever	September 2017	Member of RE100 initiative, plans to prioritize EVs					✓	
Vattenfall	September 2017 February 2017	• Joined RE100 initiative • In February 2017 Vattenfall pledged to transition its entire vehicle fleet to EVs within the next five years					✓	✓

WORK-IN-PROGRESS

Automobile Manufacturer/OEM Targets

The automobile industry is quickly embracing electric vehicle technology and the majority of global car manufacturers are developing long-term EV targets, though the scale of these targets differs widely. For example, the German automobile companies BMW, Daimler and Volkswagen expect that electric vehicles will account for up to 25% of sales by 2025, and Volvo and Peugeot are targeting a higher share as they quickly move to scale up development of electric models

Auto companies are actively working on introducing electric car models. Hyundai is planning for 26 hybrid, fuel cells and battery electric vehicles models by 2020, and GM aims for 10 different electric vehicle models in the same year,

In the absence of a specific target, Rolls-Royce has announced that they plan to skip hybrid-electric vehicles and move directly to producing electric vehicles once the technology has reached a certain level of maturity. Volvo has already ramped up its research and plans for all new models to be at least partially electric from 2019.

While Tesla is commonly seen as a major influencer in the electric mobility market, currently, the most dominant electric car company is Renault-Nissan, which sold nearly half a million electric vehicles in 2016 and has set an ambitious target to sell 1.5 million electric vehicles in 2020.

Company	Date	Targets and Projections
Mercedes-Benz	September 2017	Mercedes-Benz will electrify its entire car lineup by 2022
	March 2017	Mercedes-Benz Cars to bring more than 10 new electric cars to market by 2022 through 10 billion euros ($10.8 billion) of investment, having previously aimed to achieve the target by 2025.
BMW	June 2017	0.1 million electric car sales in 2017 and 15-25% of the BMW group's sales by 2025
	May 2017	EV sales account for three percent of BMW's overall sales
Chinese OEMs	June 2017	4.52 million annual electric car sales by 2020
Daimler	June 2017	• 0.1 million annual electric car sales by 2020, • Plans for 10 new all-electric models and 15 to 25% of all their production being electric by 2025
Daimler-Bosch joint venture	November 2012	The Daimler-Bosch joint venture increased their original target of building 1 million motors by 2020, to 2 million units.
Delphi	August 2016	Electric vehicles (including hybrid) sales to reach 22 million by 2025
Fiat Chrysler Automobiles	August 2017	After 2019 all Maseratis will be electrified
Ford	June 2017	13 new EV models by 2020
	January 2017	To spend $4.5 billion in electrified vehicles by 2020, 40% of its model to have electric version by 2020
General Motors	October 2017	20 new EV models by 2023
	June 2017	30 thousand annual electric car sales by 2017
	May 2017	GM has plans to introduce 10 different electric models by 2020
Honda	October 2016	Two-thirds of the 2030 sales to be electrified vehicles (including hybrids, PHEVs, BEVs and FCEVs) The electric vehicles (mostly gas-electric hybrids) currently account for 5% of Honda's sales

WORK-IN-PROGRESS

Company	Date	Targets and Projections
Hyundai	August 2017	Hyundai to introduce new electric cars for 2022
	April 2016	By 2020, 26 planned vehicles include at least 12 hybrids, six plug-in hybrids, two EVs and two fuel cell vehicles spread across the Hyundai and Kia lineups
Peugeot and Citroen cars	July 2017	Hybrid or electric versions of 80 per cent of its cars by 2023
Renault-Nissan Alliance with Mitsubishi Motors	July 2017	Electric vehicles will be 20% of sales by 2020 where market conditions are right
	June 2017	1.5 million cumulative sales of electric cars by 2020
	February 2017	Cumulative sales reach 424,797 electric vehicles worldwide
Rolls-Royce	July 2017	Rolls-Royce is skipping hybrids and going straight to electric cars
Ashok Leyland	July 2017	Target of clocking 10-15 per cent of its total volumes from electric mobility solutions by 2020
Schaffler	November 2016	46% by 2030 with 120 Million vehicles
Jaguar Land Rover	November 2016	Half of all new Jaguar Land Rover vehicles will be available in an electric version by 2020
Tesla	August 2017	Tesla has now 380 Superchargers in the USA, 921 worldwide
	July 2017	First mass-market electric model of Tesla (Model S) gets delivered
	June 2017	0.5 million annual electric car sales by 2018, 1 million annual electric car sales by 2020
	January 2014	Tesla has now 58 Superchargers in the USA
Toyota	July 2017	Toyota set to sell long-range, fast-charging electric cars in 2022
	September 2016	Toyota's target is to reach 50% of its European sales with hybrid vehicles by 2020, with a hybrid version in every major market segment.
	October 2015	Achieving sales of 1.5 million hybrids annually and 15 million hybrids cumulatively by 2020.
Volkswagen	September 2017	VW plans to roll out 80 electric and hybrid models by 2025
	June 2017	2-3 million annual electric car sales by 2025, Volkswagen, 25% sales in 2025
	October 2016	The Volkswagen group target is for 30 new EV models by 2025
Volvo	July 2017	Every Volvo it launches from 2019 will have an electric motor, marking the end of cars that only have an internal combustion engine (ICE) and placing electrification at the core of its future business.
	October 2015	By 2020, 10% of Volvo's global sales will be electrified cars