Nucleus
ADVISORS

HOW ELECTRIC VEHICLES WILL DRIVE THE FUTURE?

Report
Dec 2020

Nucleus ADVISORS

Contents

Executive Summary

Every business in this world has fallen prey to disruption and innovation and the automobile industry is no exception. New technologies, change in trends, need for safety and protection of environment are some of the reasons why the automobile industry is undergoing a huge change.

The Indian Automobile Industry has seen a huge interest from the people about their preferences being shifted from Internal Combustion Engines to Plug-in Hybrid Electric Vehicle (PHEV) or Battery Electric Vehicle (BEC). In fact there is a segment of people, called the green consumers who are of the interests to buy offerings that don't pollute the environment and are completely renewable.

Consumers are now more concerned about the environment like never before and have realized that the pollution, increased oil consumption and the rising prices will affect their lifestyle and their spending habits.

The most important objective here is to tap the most promising alternative options, ensure zero tailpipe emission and long-term economic and viability. Many companies have already started taking this move seriously and are facing stern competition from its peers.

Trends such as internet connected cars, fast charging EVs, are bringing a change in the Industry and will therefore help in reducing the carbon footprint.

Introduction

India has seen a surge in Automobile Production and sales for a long time and has proved time and again that the Automobile Industry is one such Industry which will not fall off the cliff so easily.
In the times before the Independence, we have mostly had automobiles being assembled or imported from England, Germany and the United States. And the industry was felt to be slightly stagnant with respect to its growth.
The industry saw a major advancement post the economic reforms along with permission for 100% Foreign Direct Investment (FDI) in 1991. Post this move companies, like Tata Motors Ltd., Maruti Suzuki India Ltd., Mahindra and Mahindra, Ashok Leyland Ltd., Hyundai Motor India Ltd have been the major players in the Indian Automobile Industry.

4th

India is the 4th largest Auto Market in the world

2.36%

Domestic automobiles production increased at 2.36% CAGR between FY16-20

30 Mn

Penetration of EVs in automobile sales, target of Indian Government by 2030

20%

EV sales, excluding E-rickshaws, witnessed a growth of 20% in FY20 driven by 2-wheelers

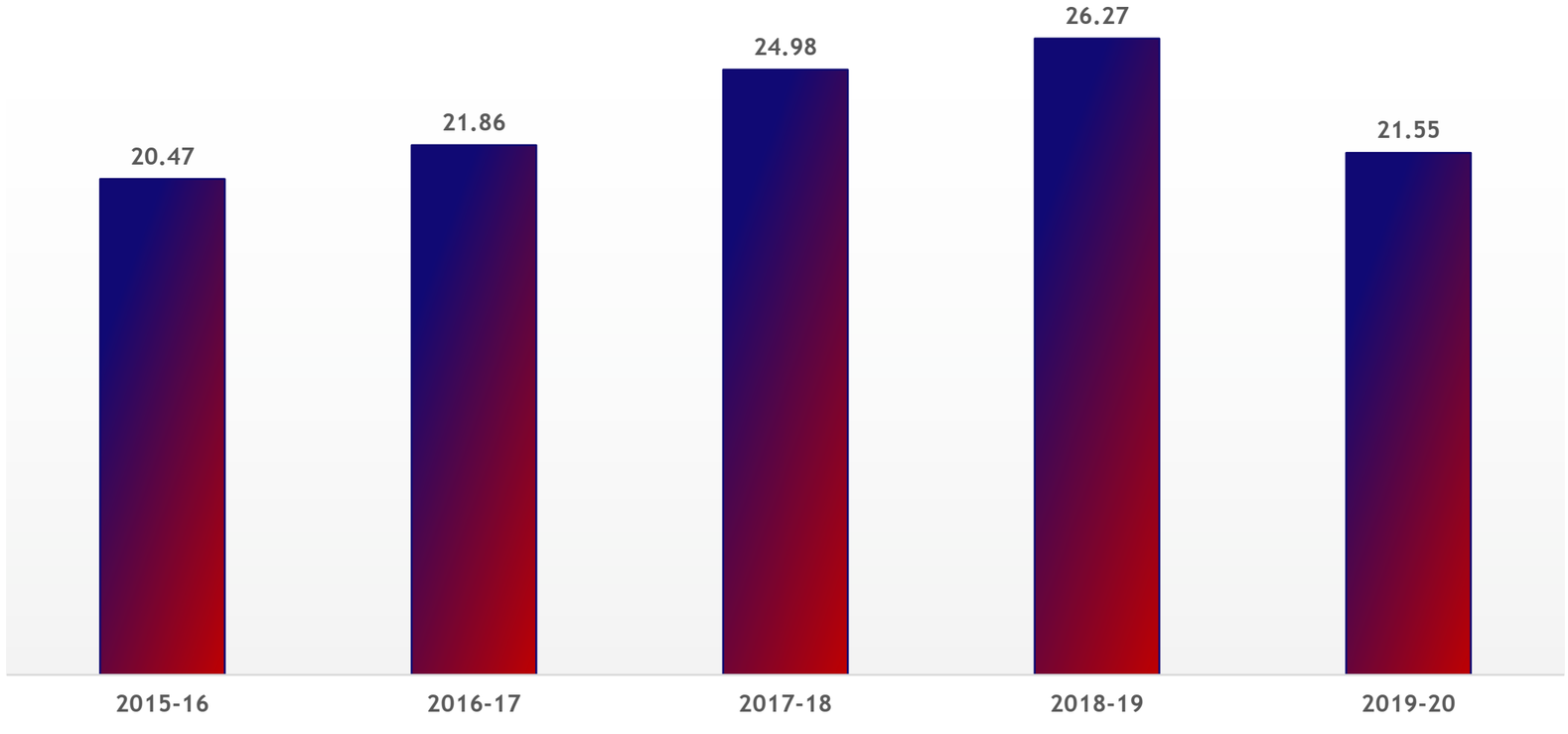
601 Mn

Funding received by Indian electric vehicle startups across 77 funding deals between 2014 & 2019

167

Active Investors in the electric vehicles startup ecosystem in India

Production Trends of the Indian Automobile Industry (Units in Mn)



Source : SIAM
https://www2.deloitte.com/content/dam/Deloitte/in/Documents/consumer-business/in-consumer-future-of-mobility-noexp.pdf

The Need for a Shift

Cars have always been a symbol of freedom to travel to places as people wish, which also reflects on their character and social status. Although they consider these factors while buying a car, there are some negative impacts on this.

Production and Distribution

Cars use a lot of energy before making it into the open road. Automotive manufacturing leaves a giant footprint because it is important to manufacture products such as steel, rubber, glass, plastics, paints and many more before a new ride is ready for roll. Likewise, the end of the life of a car doesn't mark the end of its effect on the world. Plastics, toxic acids from batteries, and other products can remain in the environment. Fortunately, pile ups from junkyards are becoming much smaller than they used to be in the past. Around three-quarters of today's average car can be recycled including the bulk of a steel frame.

Environmental costs of processing, recycling, and disposal are difficult to measure, and generally beyond most consumers' control. It is also true that much of the environmental effects of a car, maybe 80 to 90 percent, would be attributed to air pollution and greenhouse gas fuel consumption and emissions that climate scientists believe are driving global warming. Luckily, the degree of that impact is much under the control of the driver.

Fuel Costs

Petroleum products raise environmental red flags even before they are burned. An energy-intensive method that can destroy local habitats is removing them from the earth. Shipping fuels can also consume a lot of energy and, like an oil spill, cause an occasional environmental tragedy. As world demand grows, and unconventional fuels, such as oil sands, become economically more viable, the ecological effects of the production of petroleum may also increase significantly. This is yet another reason why fuel efficiency is so important.

Air Quality

Vehicles are America’s biggest air quality compromisers, producing about one-third of all U.S. air pollution. The smog, carbon monoxide, and other toxins emitted by vehicles are especially troubling because they leave tailpipes at street level, where humans breathe the polluted air directly into their lungs. That can make auto emissions an even more immediate health concern than toxins emitted high in the sky by industrial smokestacks.

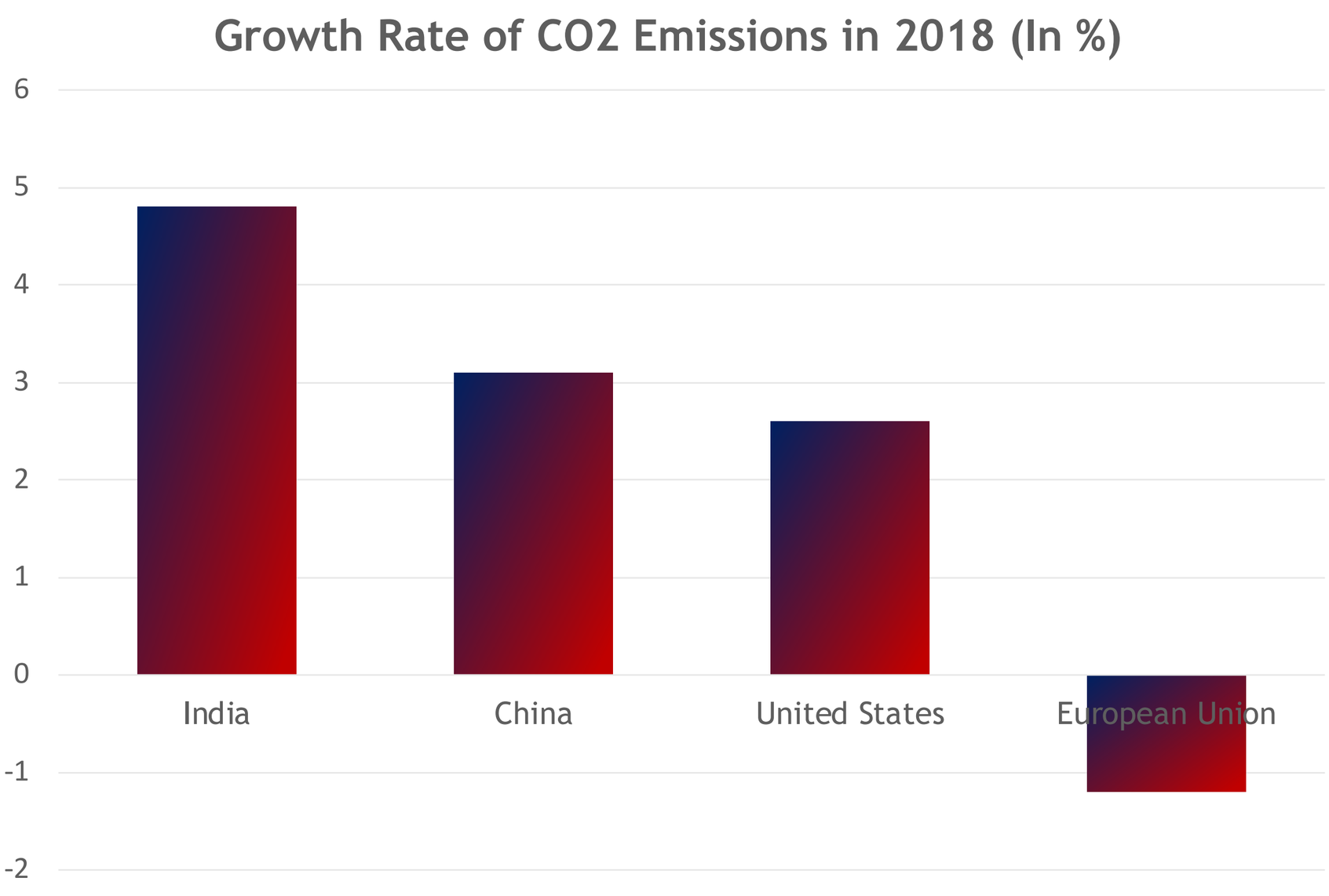
Source: National Geographic

Infrastructure

Also difficult to quantify, another associated impact of cars is the building of roads to support them, as well as the urban sprawl that tends to follow in their wake. This issue can be difficult to tease out of other factors, such as population growth and resource consumption, but it is also not easily addressed by technological advancements like fuel efficiency and electric propulsion. Road building has a big impact on emissions and wildlife.

Usage of Fossil Fuels

Most cars today have an engine that runs on gasoline. To get the gasoline, one would have to drive to a gas station and put a hose into the side of a car and start pumping the gas through the nozzle. The engine then burns up these fossil fuels into pollution which then comes out of the tailpipe and into the air. Not only does pollution have environmental effects, it also affects the human body. Again, the UCS stated “Particulate matter (soot) emissions produce haze and can cause chronic bronchitis, aggravated asthma, and elevated occurrence of premature death. Clearly human health is in danger with so much air pollution around. This is another reason why there must be an alternative fuel source for powering cars. Clean fuel sources will save lives and lead to healthier people.



Source: National Geographic

The Alternative Way Forward

There are many stories of different cars running on hydrogen, propane, and even water. All those are interesting; however, it is not practical. The most practical and reliable fuel source, besides fossil fuels, is electricity. Electricity is a cleaner source of energy, and it is very easily accessible. These cars are plugged into a big outlet just like charging a cell phone. Electricity does not pollute the air like fossil fuels do.

The Electric Vehicle (EV) market is forecast to be worth over £450 billion by 2025. As both governments and vehicle manufacturers seek to radically shrink the market for Internal Combustion Engine (ICE) cars in the next 20 years, there is a lot to play for in the EV world. Most customers around the world have also shifted their focus from the Internal Combustion. This shift comes as result of the factors that consumers are considering while buying EVs.

Some Factors are

Love of Cars

Cost Efficiency

Saving the Environment

Fuel Economy

Latest Technology

According to Study by Deloitte Global Automotive Survey, some of the factors that hinder a customer's perception while buying an EV

	Range	Cost	Charging Points	Time to Charge	Brand Offering
	14%	14%	25%	11%	7%
	24%	26%	22%	10%	3%
	26%	24%	22%	13%	4%
	25%	9%	18%	12%	3%

Source:
https://www2.deloitte.com/content/dam/Deloitte/in/Documents/consumer-business/in-consumer-future-of-mobility-noexp.pdf
Starcount.com

Plans and Programs to Incentivize the Move

When it comes to adaption, India has had a solid record with country adapting policies giving out bold results. When it comes to electric vehicles, the transport minister made a bold statement that India would adapt and move to 100% electric cars by 2030. This statement was made in consonance with the National Electric Mobility Mission Plan presented by India empowering electric vehicles that meet customer performance and cost possibilities through collaboration among Government and different industries for the progression and improvement of indigenous assembling limits, required infrastructure, consumer awareness, and innovation to ascend as a pioneer in the EV Two Wheeler and Four Wheeler market on the planet.

Faster Adoption and Manufacturing of Electric Vehicles

In April 2015 , the Government initiated a scheme for the Quicker Adoption and Manufacture of (HEVs &) Electric Vehicles (FAME India) with a budget of Rs. 795 crore for the first year (2015-16 & 2016-17) of the scheme. Incentives for electric and hybrid vehicles of up to Rs 29,000 for bikes and Rs 1.38 lakh for cars are offered under the scheme. However, for Renown phase I, the government had allotted Rs 795.00 crore, but only Rs. 219.00 crore was included in the scheme 's phase-I.

The Phase I of the scheme expired in March 2017 but it has been extended to September 30, 2017. The purpose of the scheme is to encourage the development of a market for HEVs and EVs in all segments of automobiles, bicycles, buses, commercial vehicles, etc. It is anticipated that the development of HEVs and EVs would ensure much needed energy and ecological stability. In addition, it will promote the production of indigenous technologies and R&D capabilities so that the entire range of hybrid and electric products can be manufactured in India. Under Phase-II of the FAME India Scheme, Government of India (GoI) intends to support the development of EV charging infrastructure by extending capital grant to organizations for promoting the use of Electric Vehicles (EVs).

Green Urban Transport Scheme (GUTS)

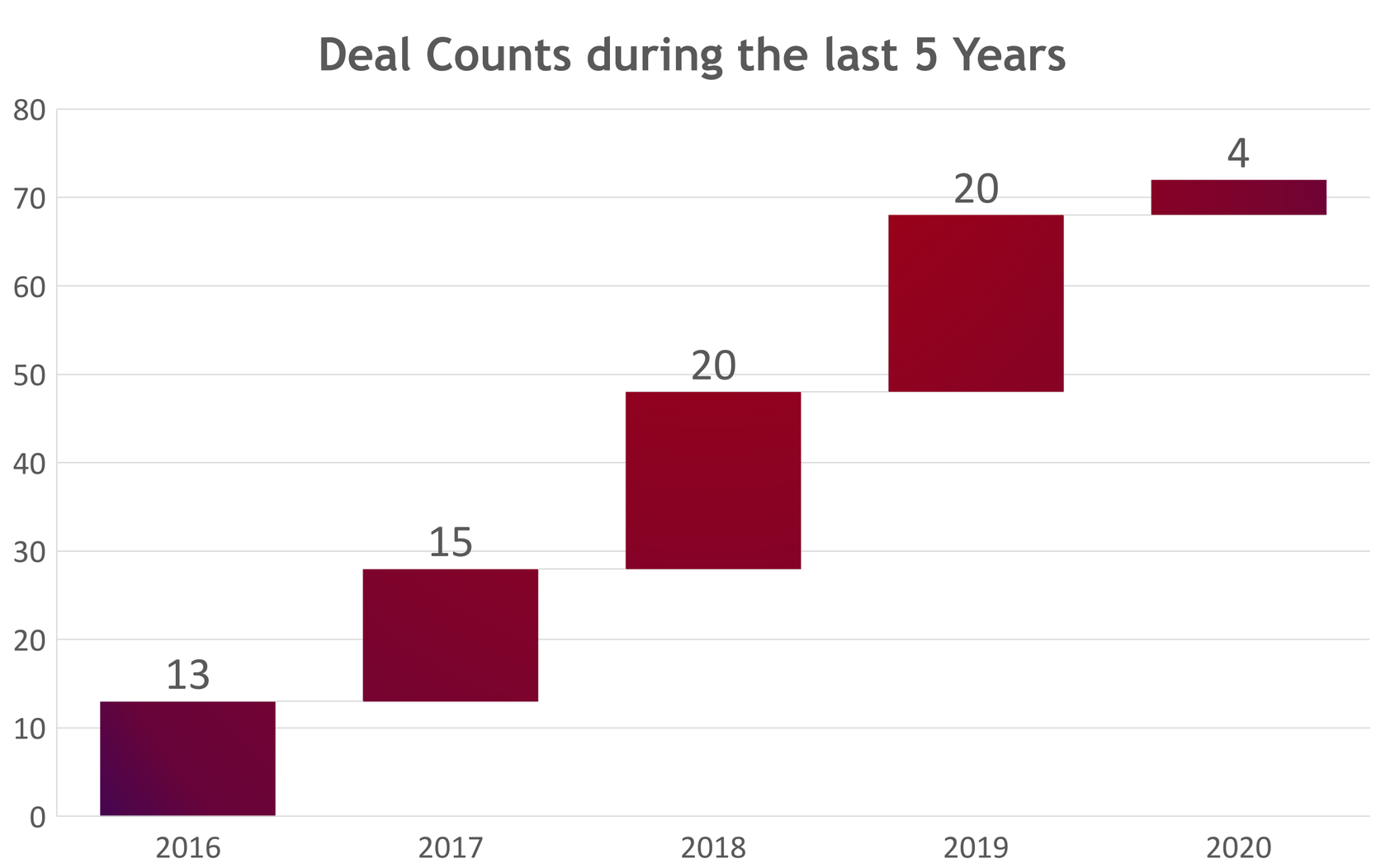
The Government has recently conceptualized a new system called ‘ Green Urban Transport 'for developing and enhancing the public transport in metropolitan areas along the low carbon pathway. The policy envisages reducing the carbon footprint and encouraging a safe public transit infrastructure that is low in carbon. The scheme will advocate for low emission integrated urban transport and encourage the use of hybrid / electric cars and non-fossil fuels like promotion of Non-Motorized Transport (NMT), integrated ride sharing, Bus Rapid Transit (BRT) networks, Intelligent Transport Systems (ITS), urban freight management etc. The machine will provide a powerful catalyst for more fuel-efficient, hybrid, electricity-efficient low carbon/ clean-fuel based vehicles.

Source: SIAM

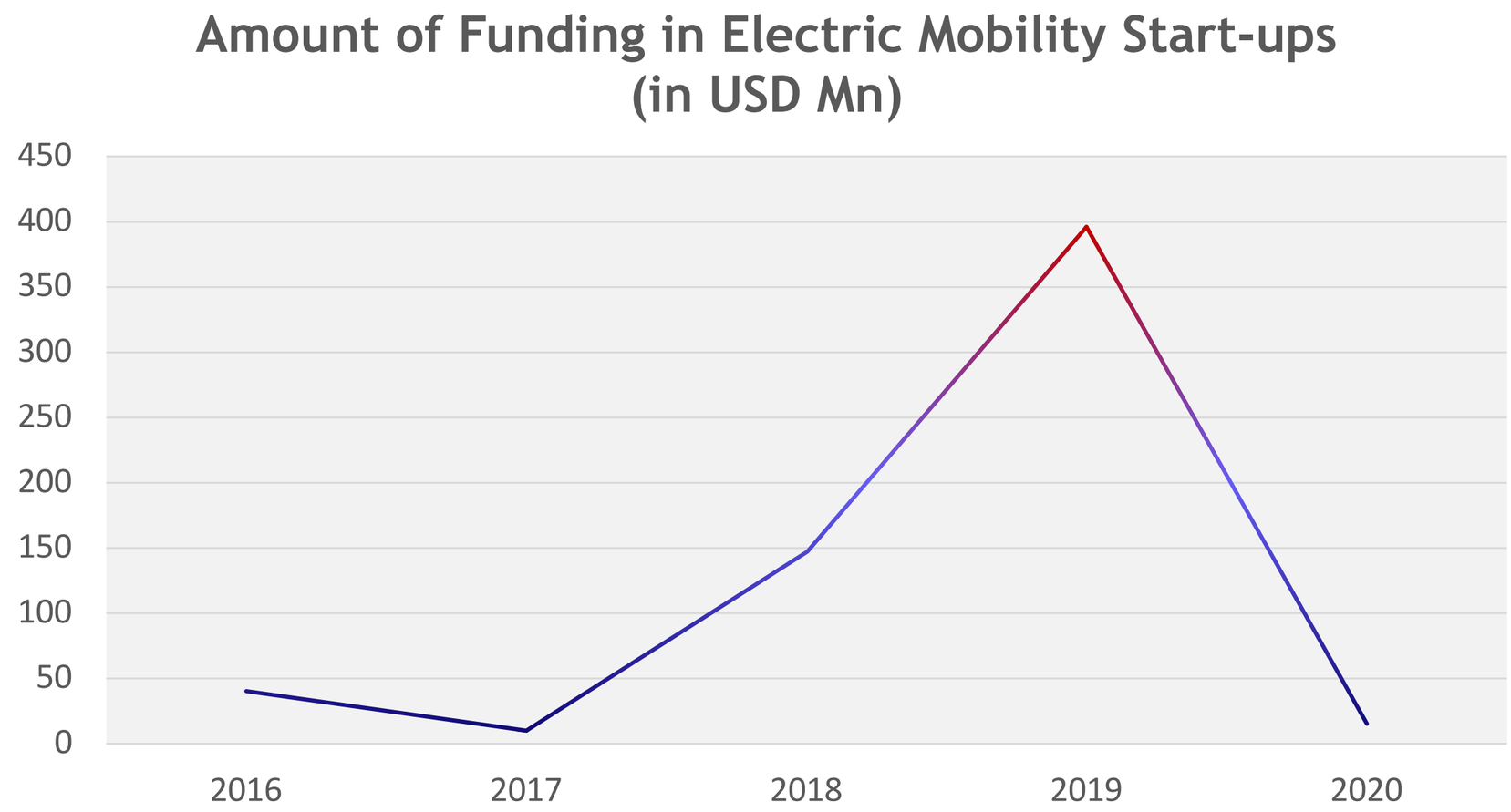
The EV Startup Landscape

The Investment Activity in the EV Sector

Deal Counts

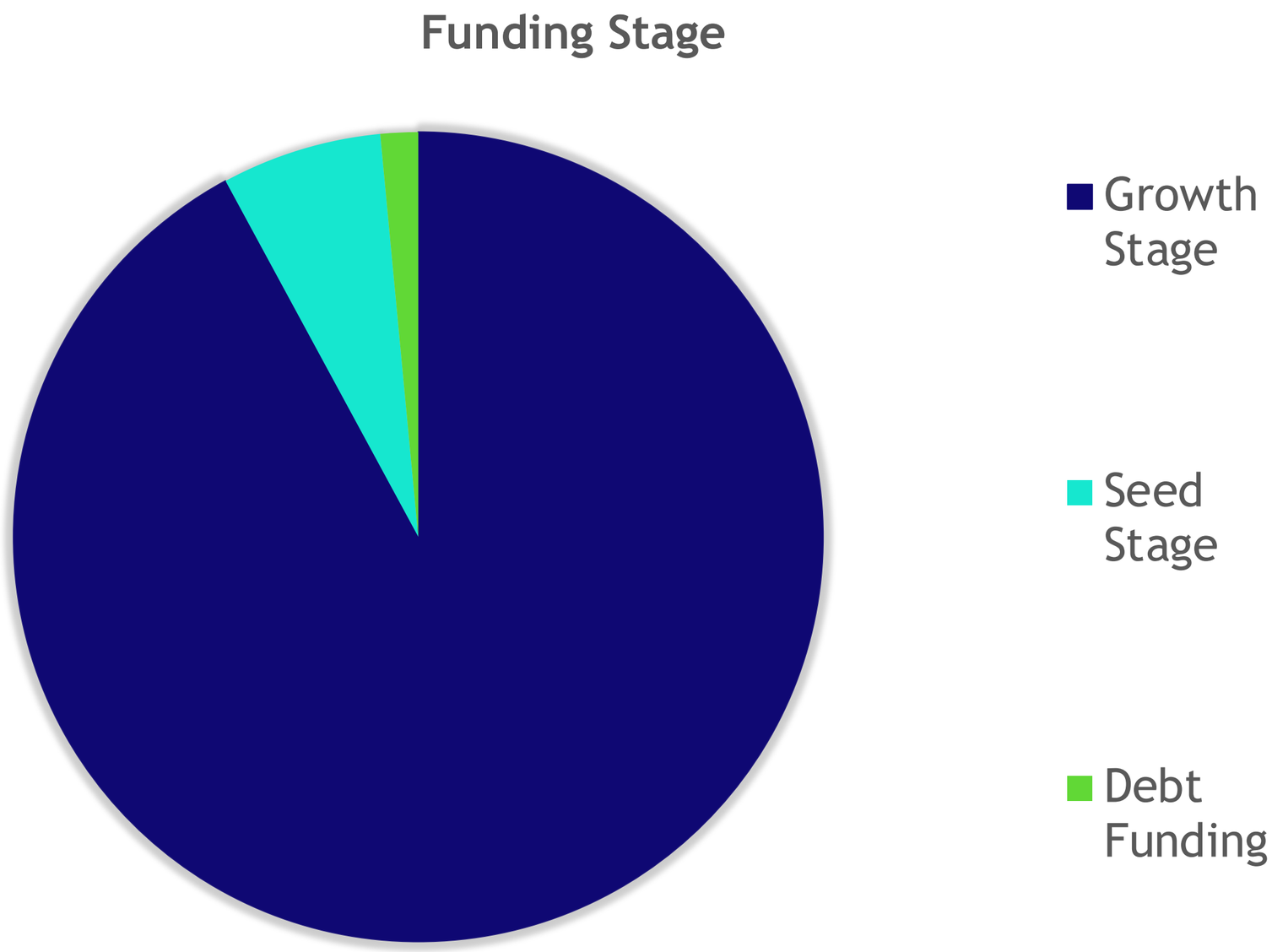


Funding in EV Startups

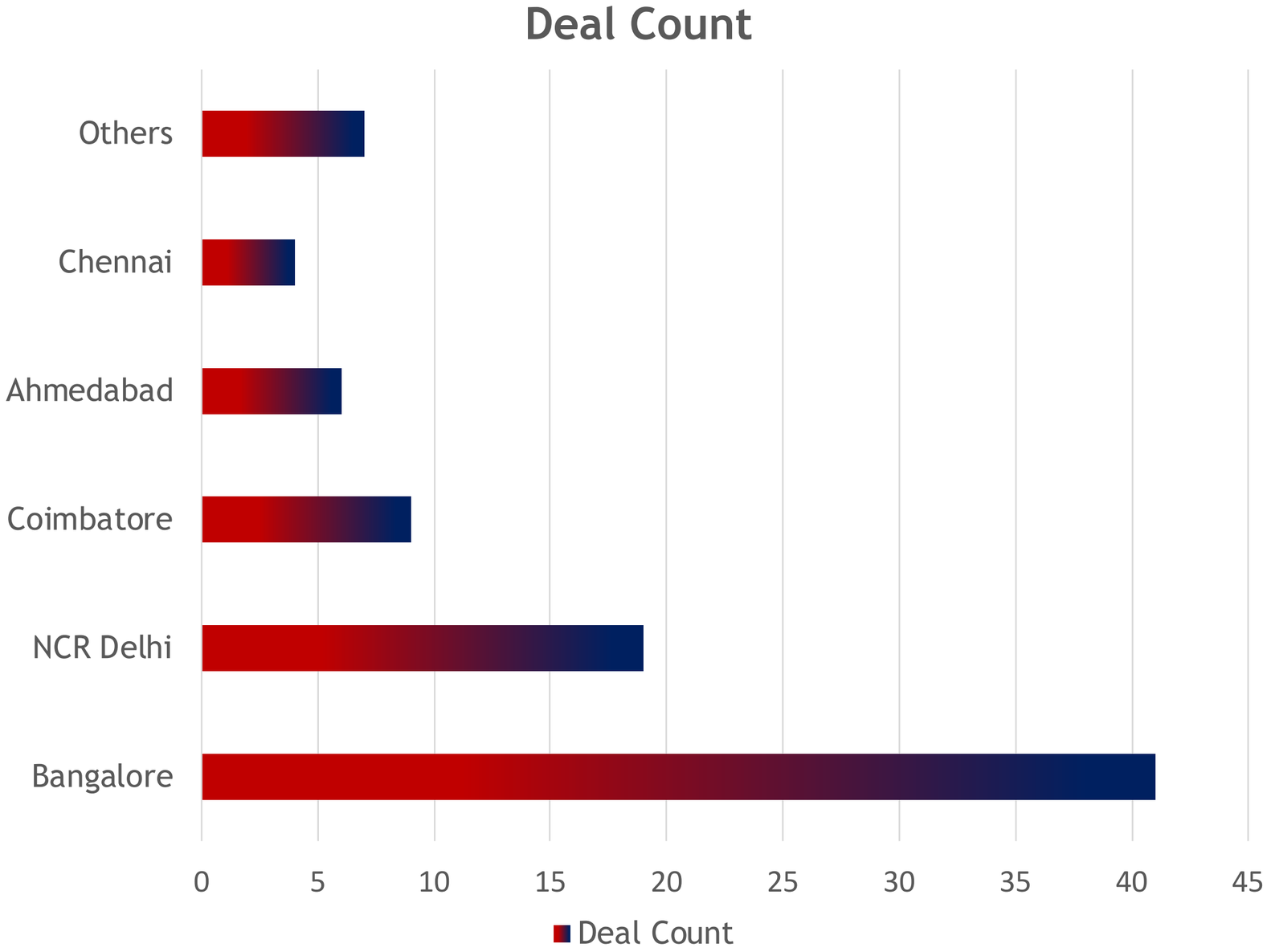


https://www.business-standard.com/article/companies/corporate-pe-investments-in-ev-start-ups-grow-170-in-2019-to-397-mn-119120301052_1.html

Funding in EV Startups

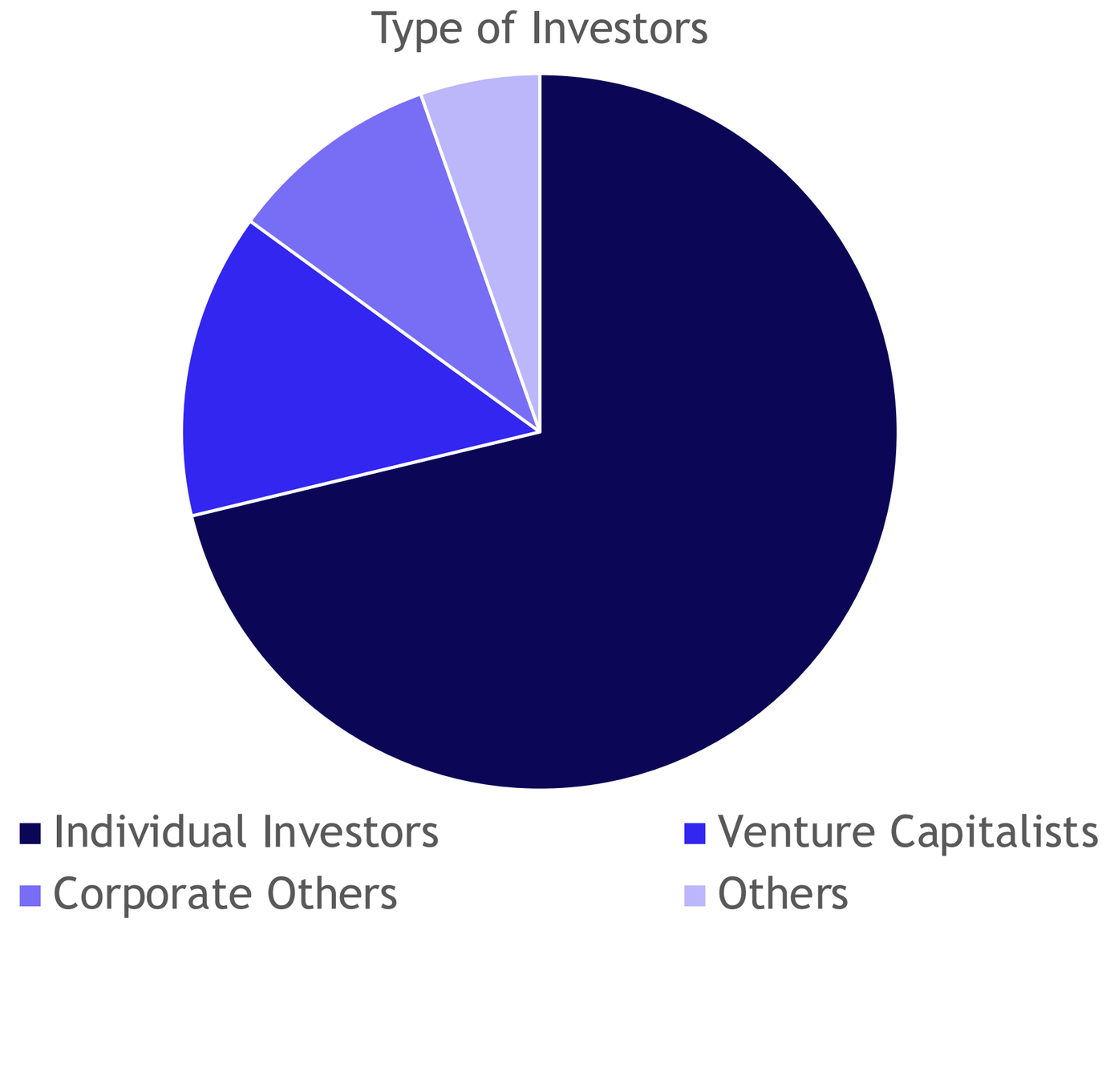


Bangalore gets the most deals in the EV Ecosystem



Source: Inc42 Electric Vehicle Market Outlook

Types of Investors



Top Deals in EV Startups

Company	Investors	Amount ($Mn)	Date
Ola Electric Mobility	SoftBank	250	July 19
Ola Electric Mobility	Arun Sarin Family, Ratan Tata, Matrix Partners, Tiger Global, Others	56	Feb 19
Ather Energy	Hero Motorcorp, Sachin Bansal	51	May 19
SmartE	Mitsui PE	15	July 19
Yulu Bikes	Bajaj Auto	8	Nov 19

Source: Inc42 Electric Vehicle Market Outlook

Some Major Players in India

1. Hero Electric

Hero Electric, a part of Hero Group, has already rolled out more than a dozen electric vehicles in the country. The company has been among the front runners in the electric vehicle segment and has electric two wheelers as well as electric three wheelers. Across its ER series, E2 series and E5 series, Hero electric rolls out a range of Optima, Nyx, Flash and Photon electric scooters.

2. Tata Motors

Tata Motors has lately unveiled the Nexon in electric version as well that has been introduced with ZIPTRON technology. The company will launch the Nexon EV in a price bracket of Rs 15-17 lakhs and will target range of 300 km to address range anxiety issues often related to EVs in the country. It has also supplied Tata Tigor in electric version to Energy Efficiency Services Limited (EESL).

3. Ather Energy

Ather Energy launched its Ather 450 & Ather 340 electric scooter Models in India last year that have been primarily designed for city usage. The company claims that both the electric scooters have been designed to address various problems in EV two-wheeler segment such as slow charging, low powered motors as well as shorter battery life. Ather Energy is also offering Ather One plan that includes free access to public and home charging, breakdown assistance as well as unlimited data service among others.

4. Mahindra Electric

Mahindra spearheaded the electric vehicle revolution in the country with its very first and much famous Reva electric car. Over the years the company has diversified into various segments and offers a range of electric vans, electric autos and e-three wheelers like Mahindra E2o, Mahindra eAlfa Mini, Mahindra eSupro, Mahindra Treo and Mahindra eVerito.

5. Lohia Auto

Lohia Auto offers a range of electric scooters, electric three wheelers as well as e-autos in the country. Comfort E-Auto HS by Lohia Auto was launched at Delhi Auto Expo in 2018 that offers a load capacity of 40 kg and offers a seating for five people including the driver.

https://autotechreview.com/siemens-automotive-engineering-simulation-and-automation-test-center/technology-and-innovation/top-10-electric-vehicle-manufacturers-in-india-their-innovations

6. TwentyTwo Motors

Rolling out electric scooters in India, Twenty Two Motors tied up with Taiwanese electric two-wheeler manufacturer Kwang Yang Motor Company (KYMCO) to expand its horizons in the country. Both companies will be developing various charging solutions across fast charging, standard charging as well as battery swapping.

7. BYD Olectra

Among the leaders in electric buses segment, Olectra BYD claims to sell over 100 electric vehicles in the country across various state transport undertakings. Nearly 40 e-buses spanning 12m in length have been deployed by Telangana Stated Road Transport Corporation have been supplied by Olectra BYD.

8. Hyundai Kona electric

Charging up the Indian electric vehicle ecosystem, Hyundai launched its Kona EV in India with ARAI-certified range of 452 km. The Kona is equipped with lithium-ion polymer battery, against the conventional nickel-metal hybrid batteries for excellent charging and discharging efficiency. The company claims the EV has been designed to make it more suitable for Indian operating conditions.

9. Ashok Leyland

Ashok Leyland, the fourth largest bus maker in the world, unveiled its first electric bus Circuit in 2016 and Circuit S at the 2018 Delhi Auto Expo. The company claims its electric buses are designed for Indian conditions and has tied up with Sun Mobility to enhance its expertise in electric vehicle domain and introduce battery swapping in electric buses to address e-mobility needs in the country.

10. MG Motor

MG Motor has created a lot of buzz with its Hector SUV and has also lately introduced its MG ZS electric car. Strategically placed against Hyundai Kona electric, The MG ZS offers ARAI certified range of 340 kms and can be charged via two options- using normal 15 A AC charger in about 6-8 hours and 50 kW DC charger that can charge the vehicle up to 80 % in less than an hour.

UPCOMING

Tesla, Inc. (formerly Tesla Motors, Inc.) is an American electric vehicle and clean energy company based in Palo Alto, California. Tesla's current products include electric cars, battery energy storage from home to grid scale, solar panels and solar roof tiles, as well as other related products and services.
As per reports, Tesla is set to make enter India in 2021.

https://autotechreview.com/siemens-automotive-engineering-simulation-and-automation-test-center/technology-and-innovation/top-10-electric-vehicle-manufacturers-in-india-their-innovations

Reasons why the growth of EVs are still lagging

Factors behind the slow diffusion of EVs

- Way more expensive than an Internal Combustion Engine Car, almost 2-2.5 times.
- The Range per charge that is available in most cars is pretty less.
- A higher range demands for a larger battery which therefore increases the cost and makes it unaffordable.

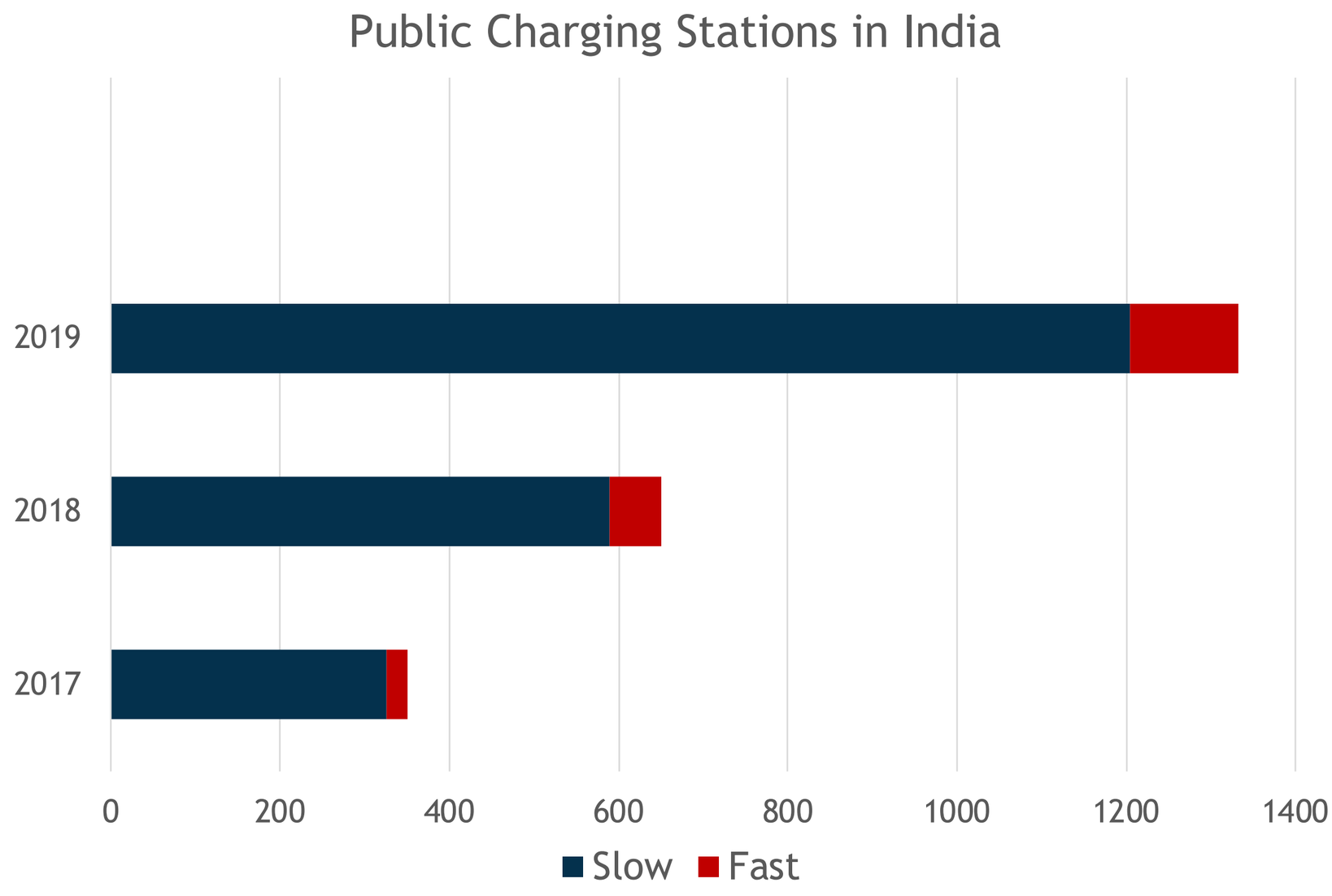
Has a range between 450-480 kms

Takes about 5 minutes to fill fuel

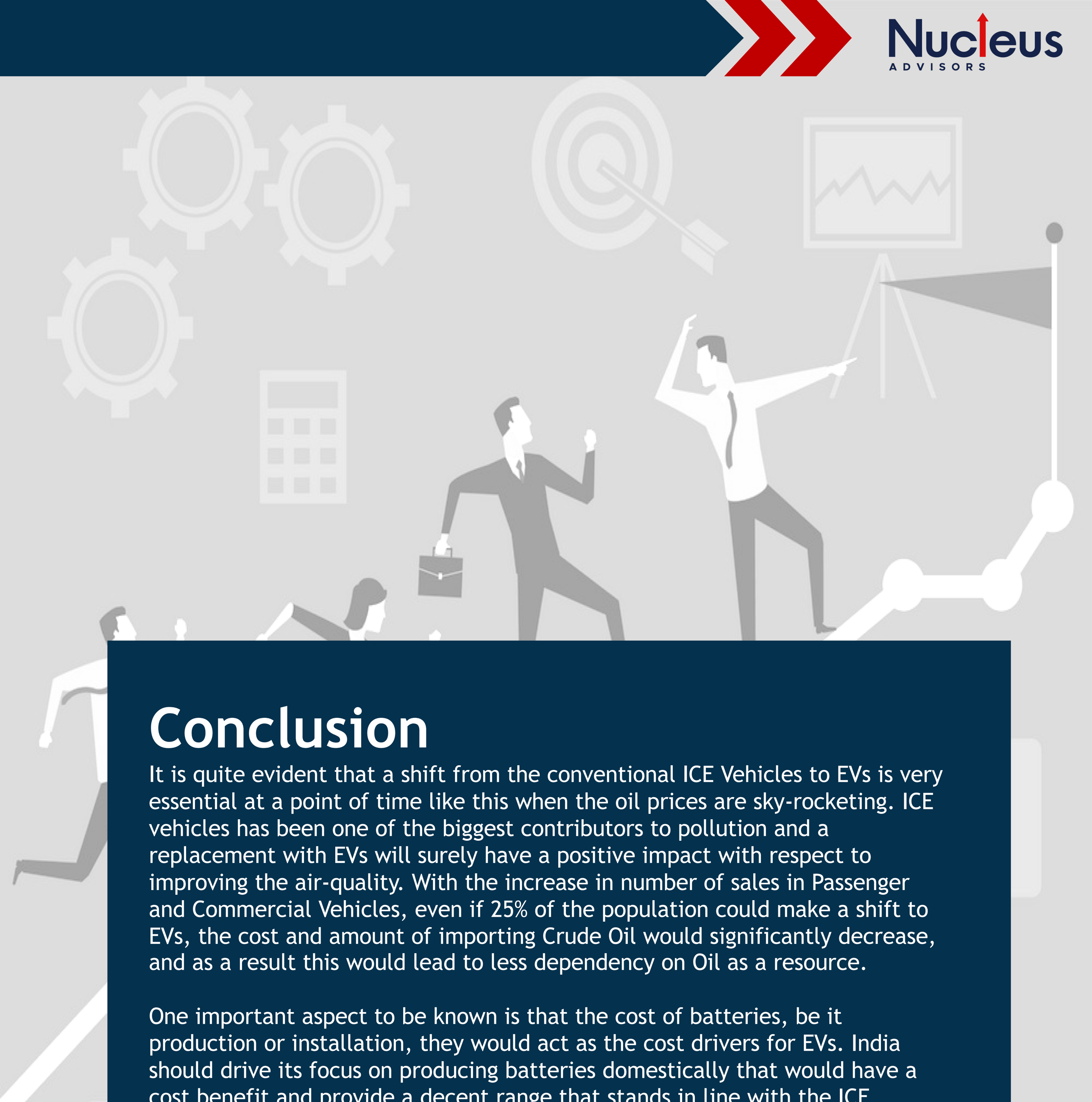
Has a range between 120-160 kms

Fast Charging – 40-45 minutes
Slow Charging – 7-8 hours

Underdeveloped Charging Infrastructure Ecosystem



Source: Inc42 Electric Vehicle Market Outlook



Conclusion

It is quite evident that a shift from the conventional ICE Vehicles to EVs is very essential at a point of time like this when the oil prices are sky-rocketing. ICE vehicles has been one of the biggest contributors to pollution and a replacement with EVs will surely have a positive impact with respect to improving the air-quality. With the increase in number of sales in Passenger and Commercial Vehicles, even if 25% of the population could make a shift to EVs, the cost and amount of importing Crude Oil would significantly decrease, and as a result this would lead to less dependency on Oil as a resource.

One important aspect to be known is that the cost of batteries, be it production or installation, they would act as the cost drivers for EVs. India should drive its focus on producing batteries domestically that would have a cost benefit and provide a decent range that stands in line with the ICE Vehicles

Although the EV Ecosystem is in its elementary stage, India is actually a quite potential market for such an improvement, and with the ongoing innovations and cutting-edge technology adopted by the major automakers, we can see a major leap of advancement in about 6-8 years.

About Us

Nucleus AAR Advisors LLP is a business consulting firm providing specialized services in the field of Investment Banking, Deal Transaction Advisory, Corporate Advisory, International Taxation, Audit & Assurance. We partner entrepreneurs in their critical decision making by providing them various analysis customized as per their requirement. We also help in the effective implementation of decisions and its subsequent monitoring as well.

Team Nucleus is comprised of people from Big4s and reputed consulting firms with combined experience of 30+ years.

Team is distinguished by their functional and technical expertise combined with their hands-on experience, thereby ensuring that our clients receive the most professional service.

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