

IDEANOMICS NEXTGEN VEHICLES & TECHNOLOGY ETF

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**ELECTRIC AND AUTONOMOUS VEHICLES  
MAY DRIVE THE NEXT WAVE IN THE MOBILITY INDUSTRY**



**The internal combustion engine (ICE) was invented in 1791.** It wasn't until Henry Ford combined ICE with mass production in the 1920s that allowed cars to be accessible to the broader public. Since that time, an entire ecosystem of automobile manufacturers, tire companies, battery suppliers, auto repair shops, and gas stations flourished. By 2011, there were more than one billion motor vehicles in use in the world, excluding off-road vehicles and heavy construction equipment.<sup>1</sup>

As combating environmental issues, climate change, and global warming become global imperatives, the world is seeking clean air alternatives to curb pollution and CO2 emissions. Mass produced ICE vehicles once revolutionized transportation, but now they are thought to be one of the greatest culprits in environmental issues. The solution is not as simple as replacing these vehicles as it requires an entire shift in the automobile ecosystem to support and sustain this change – everything from battery technology to charging stations.

We believe that we are on the cusp of a new leap forward in the area of mobility. Electric vehicles and autonomous/self-driving cars have the potential to change the way we view mobility in much the same way that automobiles did at the beginning of the twentieth century.

To facilitate exposure to the opportunities that we feel reside in new modes of mobility, we have created the Ideanomics NextGen Vehicles & Technology ETF (EKAR). The fund invests in companies that manufacture electric and autonomous driving vehicles, as well as companies that produce the components of such.

Why do we believe that electric and autonomous cars are such a good investment opportunity? And how may EKAR provide that exposure?

### A New Generation of Mobility Options

New mobility technology, which Boston Consulting Group (BCG) defines as vehicle electrification, autonomous driving, and shared mobility, has the potential to drive 40% of the automotive industry's profits by 2035.<sup>2</sup>

This paper first looks at the case for electric cars, autonomous self-driving cars, and then, the EKAR ETF and how it may provide exposure to the theme of new mobility.

## ELECTRIC CARS

### Strong Growth Expected for Electric Cars

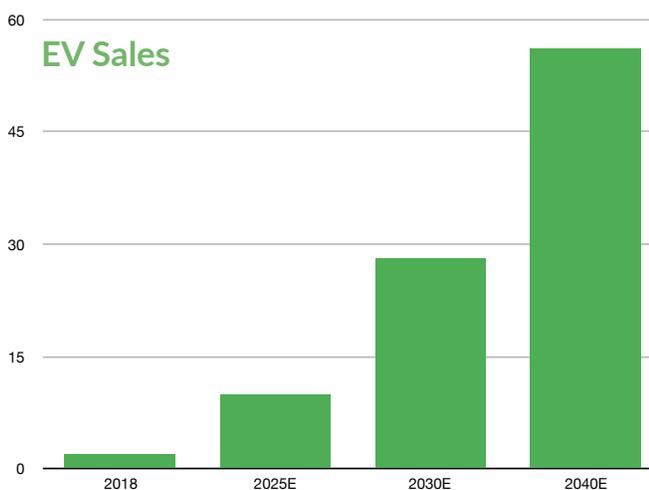
From just a few thousand in 2010 to over 2 million during 2018, sales of electric vehicles (EV) have experienced strong growth, according to a report from Bloomberg New Energy Finance (BNEF).<sup>3</sup> The report is also projecting strong growth moving forward, with estimates showing EV sales rising to 10 million by 2025, 28 million by 2030, and 56 million by 2040.

### Led by China

In 2016, China overtook the United States in the total number of EVs on the road.<sup>4</sup> China's large population, its status as the world's largest automobile market, and its efforts to curb its notorious pollution are among the reasons for the size and growth of the EV market in China, according to McKinsey.

### Raising EV's Share of the Global Fleet

Despite the increase in sales, EV's currently make up less than 0.5% of the global vehicle fleet, according to BNEF, which expects that percentage to rise to nearly one-third of the global fleet. Much of the increase is expected to be driven by demand in the emerging markets, particularly China.

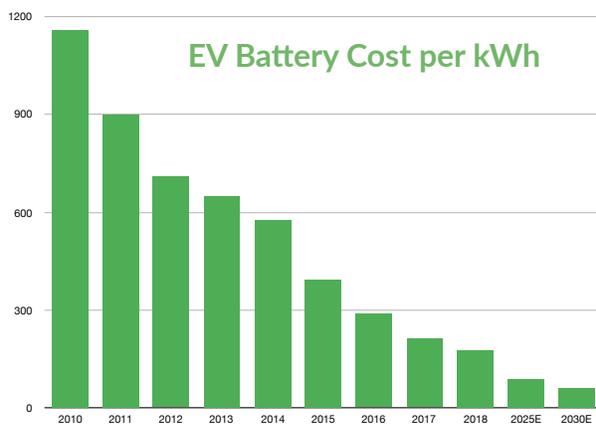


Source: Bloomberg New Energy Finance, Electric Vehicle Outlook 2019

## What Is Driving the Expected Growth of EV?

### Environmental Concerns

Emission regulations are getting tighter at both the city and national levels. The internal combustion engines (ICE) that drive current vehicles are untenable with the goal of lowering CO2 emissions. According to BNEF, CO2 emissions will continue to rise until peaking in 2030. At that point, EVs are expected to become a meaningful part of the global fleet and begin to have an impact on emissions. By 2040, BNEF expects emissions to return to 2018 levels.



### A Reduction in Battery Prices

Currently, the price of the lithium batteries used to power EVs is substantially higher than those of standard ICEs. However, over the last decade, those prices have been falling. In 2010, battery prices, quoted in kilowatt-hours, were \$1,160. By 2018, they had fallen to \$176. BNEF expects parity between EVs and ICEs by the mid-2020s and to reach \$87 by 2025 and \$62 by 2030.

Source: Bloomberg New Energy Finance, *Electric Vehicle Outlook 2019*

### Electric Vehicles Likely to Spread Beyond Passenger Vehicles

As battery technology continues to improve and as more models become available, EVs are expected to spread to other segments of the global fleet, such as the commercial segment. Already, over 400,000 electric buses are on the road, according to BNEF, and are set to accelerate moving forward. BNEF expects 56% and 31% of light and medium commercial vehicle sales, respectively, to be EVs by 2040.

A 2018 study by McKinsey noted that e-buses are the fastest-growing segment of the EV market with a compound annual growth rate of over 100% since 2013.<sup>5</sup> Europe is expected to largely transition to e-buses by 2030 as a result of the European Commission's target to support environmental issues.

China which is leading in the adoption of e-buses, accounted for 90% of new urban bus sales in 2017, according to McKinsey, which also noted that more than two-thirds of all e-buses in the world travel on roads in China.

### Can EVs Become Profitable?

One of the biggest issues with EVs is that they are more expensive to produce than cars using traditional ICEs and that manufacturers of EVs lose money on every car they produce. McKinsey notes that, on average, the cost to produce an EV is \$12,000 higher than that of a traditional ICE.<sup>6</sup>

However, McKinsey also projects that EVs have the potential to reach cost parity and become equally, or even more, profitable than ICEs by 2025. How?

Much of the price differential is due to the battery pack that is needed to operate an electric car. As noted before, battery prices have come down significantly over the past decade and anticipated improvements moving forward should help to reduce costs further and, at the same time, improve driving range.

McKinsey also notes that a significant savings can be garnered from optimizing EV designs as well as decontenting. Design simplification can cut down on vehicle production costs. Additionally, creating designs and manufacturing processes specifically for EVs rather than adapting ICE designs and processes may allow EV manufacturers to produce vehicles more efficiently. Decontenting, or removing and simplifying vehicle features can also help to reduce costs.

### Caveat – Charging Station

Charging stations remain a challenge. The number of global charging stations has increased from 77,000 in 2012 to 632,000 in 2018, according to BNEF. However, that is significantly lower than the number of gas stations.

Vehicle owners who are able to charge their EVs at home or place of work may adopt more quickly than urban residents. However, newer technology solutions such as ultra-fast chargers, wireless charging, and battery swapping may help address this challenge in the future.

## AUTONOMOUS VEHICLES (AVS)

### Rise in Sales Expectation for Autonomous/Self-Driving Vehicles

Sales of autonomous/self-driving vehicles (AVs) are estimated to reach \$54.23 billion by year-end 2019 and to grow tenfold to nearly \$557 billion by 2026, according to a 2018 study by Allied Market Research.<sup>7</sup>

According to a 2017 study, autonomous/self-driving vehicles (AVs) are expected to drive \$7 trillion in economic benefits by 2050.<sup>8</sup> Their expectation is that AVs will hit their stride in the 2035-2050-time period. Use cases for AVs have the potential to reshape how the global population thinks about mobility, driving a new landscape of concierge and ride-hailing services (self-driving cabs) as well as AV options for business in option such as package delivery and long-haul transportation.

### Mobility-as-a-Service

AVs play prominently into the mobility-as-a-service (MAAS) theme that may play a role in reshaping both the automotive and transportation industries. Within the MAAS framework, people may utilize ridesharing platforms and driverless taxis to a greater degree rather than purchasing vehicles. This theme may play out particularly in urban areas and dovetails well with the increased urbanization of populations around the world.

### Benefits of Autonomous/Self-Driving Vehicles

The adoption of AVs has the potential to offer significant financial and economic benefits. McKinsey estimates that if the United States fully adopted AVs, the benefit to the public could exceed \$800 billion a year by 2030.<sup>9</sup>

#### Safer Roads

Strategy Analytics, in 2017, estimated that 585,000 lives can be saved due to AVs in the 2035-2050 time period. This also has the potential to reduce public safety costs. McKinsey estimates that \$400 million could be saved through accident avoidance and the resulting lower medical costs.

#### More Productive Commutes

AVs may free more than 250 million hours of commuting time per year. Passengers have the potential to make more productive use of their time while sitting in traffic, such as working or viewing entertainment. In fact, McKinsey estimates that 15% of its expected benefits would arise from more productive use of commuting time.<sup>5</sup>

#### Real Estate

McKinsey estimates that nearly one-third of their estimated benefits would arise from the public sector's redevelopment of unnecessary parking spaces that would arise from AV which could park more efficiently.<sup>5</sup> AV cars occupy 15% less space than cars parked by human drivers. This is because AVs do not require open-door space for dropping off passengers when parked.<sup>10</sup>

Additionally, as an offshoot of the MAAS movement, self-driving taxis may replace some of the permanent passenger fleet, reducing the need for parking spaces.

#### Reduced CO2 Emissions

More efficient driving may lead to less gas consumption by AVs.

### Use in Ridesharing

AV may drive the next leg of growth in the ridesharing industry. According to McKinsey, ridesharing platforms only account for 1% of total vehicle miles traveled (VMT).<sup>5</sup> The economics may improve for ridesharing companies if the vehicles are self-driving, and the fare does not need to be split with the driver.

### China May Become the Dominant Market for AVs

China has the potential to become the world's largest market for AVs, according to McKinsey, which estimates \$1.1 trillion from mobility services and \$0.9 trillion from the sale of AVs in 2040.<sup>11</sup> McKinsey also estimates that AVs will make up over 40% of China's new vehicle sales and 12% of its total vehicle fleet in 2040.

Driving China's potential is its status as the world's largest automotive market (as noted by McKinsey), its large population which has spawned its notorious traffic problems along with its ensuing environmental issues. MAAS may help to encourage group ridesharing, robo-taxis, and AV buses, as well as reduce the passenger vehicle fleet.

### Public Perception of Safety

A 2018 Forbes noted that recent accidents involving AVs had reduced the public's confidence. The article noted that a recent study by AAA shows that 73% of U.S. adults surveyed in May 2018 would be too afraid to ride in a fully self-driving vehicle and that 63% said they would feel less safe sharing the road with self-driving vehicles.

## WHO ARE LIKELY TO BE BENEFICIARIES OF THE MOVE TO ELECTRIC AND AUTONOMOUS VEHICLES?

**Original equipment manufacturers (OEMs):** or companies who produce EVs have the potential to benefit from the expected adoption of EV and AV technology. However, other companies also have the potential to benefit from these changes in the automotive industry.

**Battery Producers:** Companies that produce batteries along with those that mine or produce materials, chemicals, and components that are used in the production of batteries that power EVs.

**Suppliers:** Companies that produce or distribute parts and components used in EVs and AVs.

**Semiconductors & Software:** Companies that produce semiconductors or software that are used in EVs and AVs?

## AUTONOMOUS VEHICLES IN THEIR PORTFOLIOS?

Ideanomics has created a portfolio that aims to provide investors with exposure to the electronic and autonomous vehicle industry. How do we do that?

### The Ideanomics NextGen Vehicles & Technology ETF (EKAR)

The Ideanomics NextGen Vehicles & Technology ETF (EKAR) seeks to provide investment results that, before fees and expenses, tracks the performance of the Innovation Labs Next Generation Vehicles Index. The index aims to provide investors with exposure to the electronic and self-driving/autonomous vehicle industry. To provide this exposure, the index focuses its portfolio holdings into four segments:

**Battery Producers**  
Companies that mine or produce materials, chemicals, and components that are used in the production of the batteries used to power such vehicles.

**Original Equipment Manufacturers (OEMs)**  
Companies that design, manufacture and/or distribute new energy vehicles (NEV) or autonomously driven vehicles (ADVs).

**Suppliers**  
Companies that produce or distribute parts and components used in NEVs and ADVs.

**Semiconductors & Software**  
Companies that produce semiconductors and software used in NEVs and ADVs.

By including companies from these four segments, the fund aims to provide investors with exposure to the entire supply chain in the electronic and autonomous vehicle industry.

### Why Invest in EKAR

- Clear air initiatives may increase demand for vehicles powered by greener sources of energy.
- Self-driving vehicles may provide increased mobility to segments of the population unable to fully operate a car.
- EKAR aims to provide exposure to the entire supply chain in the NEV and ADV industry.
- EKAR tracks an index that looks to hold the best-in-class companies from around the globe.

### Where EKAR May Fit in Your Portfolio

- Equity Exposure – EKAR may be used as a portion of your portfolio's equity allocation.
- ESG Exposure – With its goal of providing exposure to greener and more inclusive forms of transportation, EKAR may be appropriate as a portion of your ESG allocation.
- Thematic Exposure – EKAR may be appropriate for investors looking to invest in industry-disrupting technologies.

## SUMMARY

We believe that we stand on the cusp of a seismic change in the area of mobility. Over the next decade, electric and autonomous/self-driving vehicles have the potential to replace the internal combustion engine and upend the entire way that we view mobility.

We believe that the EKAR ETF may provide investors with exposure to this investment opportunity. EKAR invests in the entire supply chain of the electric and autonomous/self-driving vehicle industry.

An investment in EKAR may provide investors with exposure to the opportunities that these new modes of mobility may offer.

## DISCLOSURE

Carefully consider the Fund's investment objectives, risk factors, charges and expenses before investing. This and additional information can be found in the Fund's prospectus, which may be obtained by visiting [ekar.ideanomics.com](http://ekar.ideanomics.com). Investors should read it carefully before investing or sending money.

Investing involves risk, including possible loss of principal. International investments may also involve risk from unfavorable fluctuations in currency values, differences in generally accepted accounting principles, and from economic or political instability. Emerging markets involve heightened risks related to the same factors as well as increased volatility and lower trading volume. Narrowly focused investments and investments in smaller companies typically exhibit higher volatility. There is no guarantee the fund will achieve its stated objective.

There is no guarantee that the Methodology will generate or produce the intended results. Next Generation Vehicles are a relatively new development and there can be no assurance that they will be widely adopted by the general public. Companies may be subject to risks related to rapid changes in technology, worldwide competition, rapid obsolescence of products and services, loss of patent protections, evolving industry standards and frequent new product production, and changes in business cycle and government regulation. The fund will be subject to the risks of its underlying holdings, that may include, battery producers, mining companies, producers or distributors of parts and components, software, semiconductors, that the technologies may not succeed.

Shares are bought and sold at market price not net asset value (NAV) and are not individually redeemed from the Fund. Market performance is determined using the bid/ask midpoint at 4:00pm Eastern time when the NAV is typically calculated and do not represent the returns an investor would receive if shares were traded at other times. Brokerage commissions will reduce returns.

Exchange Traded Concepts, LLC serves as the investment advisor, and Penserra Capital Management LLC serves as the sub-advisor to the fund. The Funds are distributed by SEI Investments Distribution Co. (1 Freedom Valley Drive, Oaks, PA, 19456), which is not affiliated with Exchange Traded Concepts, LLC or any of its affiliates.

<sup>1</sup> [https://en.wikipedia.org/wiki/Motor\\_vehicle](https://en.wikipedia.org/wiki/Motor_vehicle)

<sup>2</sup> By 2035, New Mobility Tech Will Drive 40% of Auto Industry Profits, Boston Consulting Group, 1/11/18

<sup>3</sup> Electric Vehicle Outlook 2019, Bloomberg New Energy Finance, 5/15/19, retrieved 10/4/19

<sup>4</sup> Dynamics in the Global Electric Vehicle Market, McKinsey Center For Future Mobility, July 2017

<sup>5</sup> Fast Transit: Why Urban E-Buses Lead Electric Vehicle Growth, McKinsey Center For Future Mobility, September 2018

<sup>6</sup> Making Electric Vehicles Profitable, McKinsey Center for Future Mobility, March 2019

<sup>7</sup> Garsten, Ed, Sharp Growth in Autonomous Car Market Value Predicted but May Be Stalled By Rise in Consumer Fear, Forbes, 8/13/18

<sup>8</sup> Lanctot, Roger, Accelerating the Future: The Economic Impact of the Emerging Passenger Economy, Strategy Analytics, June 2017

<sup>9</sup> The Trends Transforming Mobility's Future, McKinsey & Company, March 2019

<sup>10</sup> Bertonecello, Michele, & Wee Dominik, Ten Ways Autonomous Driving Could Redefine the Automotive World, McKinsey & Company, June 2015

<sup>11</sup> How China Will Help Fuel the Revolution in Autonomous Vehicles, McKinsey & Company, January 2019