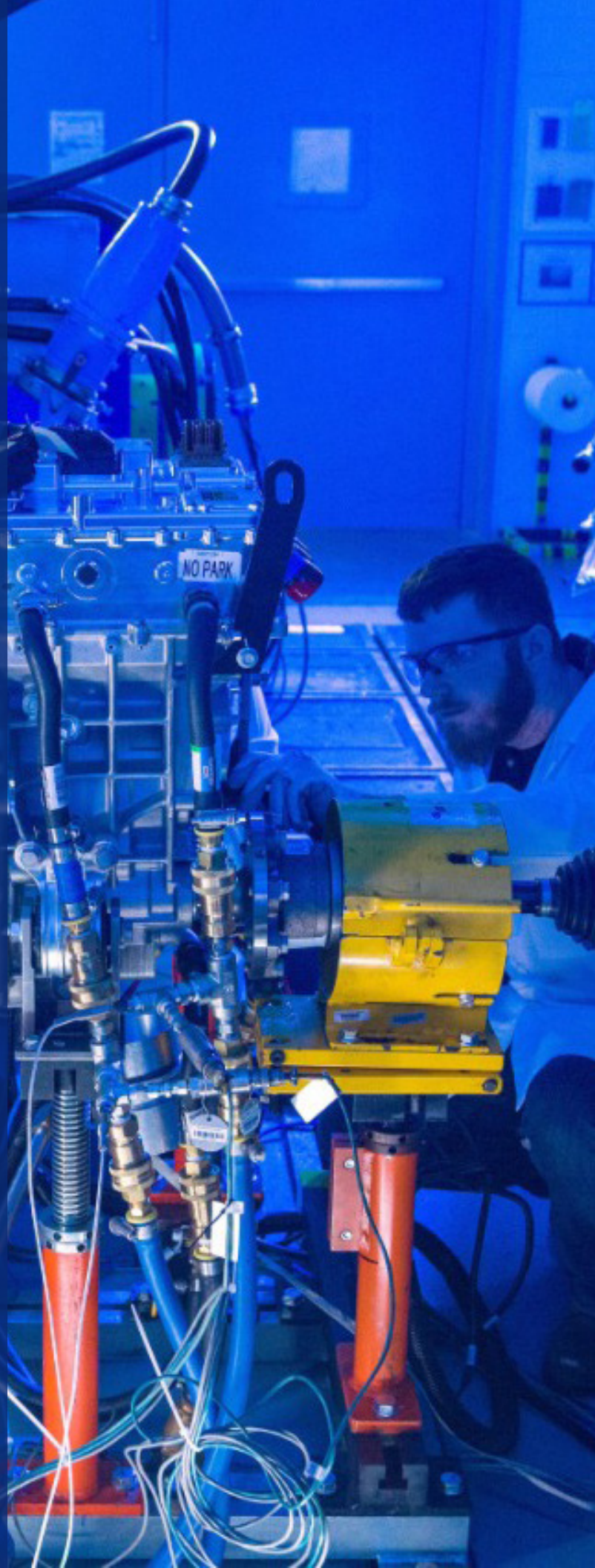


Powering Up Electric Vehicles Key Part of Michigan Future Plans

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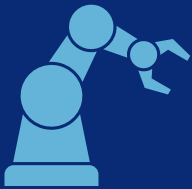
The future of the automobile industry is coming into focus and it is electric. Automakers are rolling out more battery-powered cars, trucks and SUVs for the public to drive and enjoy. EV automaker Tesla has been the focus of attention for years, but now other companies such as Ford and General Motors are jumping into the spotlight with dynamic new products.

General Motors has announced it will invest more than **\$3 billion** in Southeast Michigan to add new electric vehicles to its product line.

Ford's Mach-E, a Mustang-inspired EV crossover, sold out soon after it was unveiled in November 2019. More recently announced vehicles, such as GM's 1,000-hp GMC Hummer pickups and SUVs and an all-electric Ford F-150 – billed as the fastest and most powerful F-150 ever – are due out in a year or two and stirring up excitement.

Automakers now have clearly committed to building EVs and the batteries that power them. GM has announced it will invest more than \$3 billion in Southeast Michigan to add new electric vehicles to its product line. GM's plan includes spending \$2.2 billion to renovate its Detroit-Hamtramck plant to begin production of the Hummer pickup, GM's first all-electric pickup truck, in late 2021. That pickup will be followed by an all-electric Hummer SUV and then the Cruise Origin, a shared, electric, self-driving vehicle.

Ford announced it will also expand its operations in two key facilities and establish a new vehicle modification center for electric vehicles in southeast Michigan as part of a \$1.45 billion investment in an EV future. Ford's electric pickup development efforts are another way Michigan's leadership in the design and production of autonomous and electric vehicles are being bolstered.



In order to remain the leader in the global mobility revolution while strengthening the state's economy through safer, more equitable and environmentally-conscious transportation options, Michigan Governor Gretchen Whitmer signed an executive order to create a new Office of Future Mobility and Electrification (OFME).

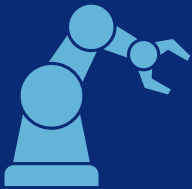
The OFME will combine Michigan's automotive manufacturing heritage with a comprehensive

Meanwhile, Fiat Chrysler Automobiles N.V., which will soon be combining with French automaker PSA and renamed Stellantis in a merger driven in part to speed up the development of electric vehicles, showed off an array of EV and hybrid concepts at CES in Las Vegas in January 2020. The company is expected to announce more developments around EVs in Michigan in the future.

DTE Energy has taken steps to promote the use of electric vehicles, announcing last summer a "Charging Forward" initiative that is designed to raise awareness of electric vehicle benefits. As part of the DTE's business, customers can also receive incentives of \$2,500 per port and \$20,000 per charger when they install Level 2 or DC Fast Chargers.

As the industry's electric revolution has gathered momentum, manufacturers have zeroed in on charging infrastructure as the single most important enabler for the rapid adoption of electric vehicles by consumers. While newer EV models displayed in Los Angeles and CES, have ranges of up 300 miles or more on a single charge, automakers note that a broad charging network is necessary to overcome driver range anxiety. Fortunately, in Michigan charging infrastructure planning is well underway.

The Michigan Department of Environment, Great Lakes and Energy (EGLE), has named Robert Jackson as the contact for small businesses and individuals in Michigan looking to resolve energy issues, including the construction of a network for charging electric vehicles that reaches every corner of the state, including rural areas. Jackson is with EGLE's Materials Management Division which now is known as the Energy Services Unit. The office is committed to promoting healthy communities, economic growth and environmental sustainability through energy waste reduction and renewable energy.

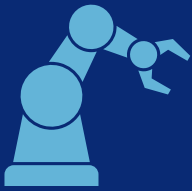


statewide approach between government, academia and private industry to enhance Michigan's mobility ecosystem. The OFME will focus on six key objectives, including a twofold approach at accelerating the state's electric vehicle (EV) adoption: attracting EV companies and creating a more favorable regulatory environment that increases EV sales and charging infrastructure.

Michigan State University has developed a blueprint for developing a charging network for the state's urban areas and major tourist destination in western and northern Michigan. The network, outlined by MSU, would run from Southeastern Michigan along I-75 and U.S. 23 all the way to Traverse City and along I-96 to Grand Rapids and beyond. Ultimately, the goal is to tie Michigan's network into the networks under development in neighboring states and the Canadian Province of Ontario, which is preparing to develop its own extensive network of charging stations that could tie into Michigan's network, according to Mr. Jackson.

Construction of the charging infrastructure, however, will require cooperation from a broad network of stakeholders to insure it is convenient, user friendly, and in the right place for maximum use and efficiency. The list includes electric utilities, which are eager to participate, as well manufacturers of electric vehicles, which are in some cases, notably Tesla, are already developing their own charging networks. New companies such as Electrify America, which are gearing up to offer charging services, also can be brought into the network. The cooperation of local municipal governments, which have control over vital mundane assets such as permits, curb cuts and zoning, is also required to insure the effectiveness of the charging network.

In this plan, the importance of proper signage also cannot be overstated. Signs for gas stations owned or operated by companies such as Shell or Exxon and others have helped define the American road because they were specifically designed to catch your attention



“The transportation mobility landscape is evolving more rapidly than ever before, and vehicle electrification is a disruptor rooted at its core,” said Trevor Pawl, the Chief Mobility Officer for the state of Michigan. “With EVs expected to pass internal combustion engine vehicle sales by the end of this decade, it’s imperative that we work together across public and private sectors to create thoughtful, competitive solutions to gain market share,” he added.

from a distance while traveling at speed. The signs for electric vehicle charging ought to be as visible as those of the traditional fueling stations that have enabled long-distance travel by vehicle across the United States. Lessons from other states could help round out the plan in Michigan and aid in connecting the state’s network to others. Common layouts, technology, and symbols also would help make it easier recognize from one state to the other and help foster cross country travel in electric vehicles.

Public safety around the charging infrastructure also has be a major concern in the design and layout of the network since, by necessity, high voltage equipment will be part of any network.

Electric vehicle charging, while rapidly evolving, presents some unique challenges because it is likely to take longer than re-fueling of a conventional automobile. Strategically locating charging sites at locations people visit frequently for long periods, such as grocery stores, movie theaters and state parks is key. Available amenities such as free Wi-Fi and rest rooms also need to be considered. The design and placement of the charging network ought to be flexible. In suburban areas, for example, perhaps only a small footprint that sits alongside existing stores and restaurants is required and would look different than a stop along I-75. Smart phone apps that indicate the location of the charging stations and allow for the ordering of food and drink at the same time could become common in the future.

At the same time, the development of EV infrastructure also must be open to use by commercial vehicles. In many cases, commercial vehicles are likely to go electric even before the general motoring public as any number of commercial haulers, including giants such as UPS and Federal Express have been conducting pilot programs using EVs



in their daily delivery fleets. In many cases, commercial carriers will maintain their own charging centers. Michigan, thanks to initiatives by EGLE, is taking steps now to convert its school bus fleet, much of which belongs to commercial operators, to electric vehicles.

The future of electric vehicles is bright, and as is tradition, **Michigan is leading the way.**

At the same time, the technology for charging must be as fast and efficient as possible. It also needs to incorporate the best and most robust technology available that can be supported by the state's electric grid. The rapid evolution of battery electric vehicles may require a quicker response and require a broader commitment to cooperation and coordination with a varied network of manufacturers, suppliers, and utilities. The state will have to keep any eye on the new technology that will offer to re-charge vehicles more quickly. Several companies are offering wireless charging, which is expected to be faster and easier to use and reach the level of convenience motorists find when they pull into a gas station now.

The resources for the initial launch of the statewide charging network have been identified as coming from the Volkswagen Settlement with Michigan getting \$64 million as its share. But this is just an initial step, and other investors including utilities and companies interested in providing service could be brought in as quickly as practical to bolster the network. "Green bonds" specifically aimed at financing environmentally friendly infrastructure projects also could be used to help pay for the new works extension. Moreover, the initial success of the network could excite the interest of new investors to put up money to build out the network.

The future of electric vehicles is bright, and as is tradition, Michigan is leading the way. Learn more at planetm.com/ofme