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Wireless Charging for Electric Vehicles

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Demand for electric vehicles (EVs) has been growing as more and more models and are coming to market, some from new automakers. One barrier to widespread adoption of EVs is the amount of charging time that is required, especially when using home or other charging systems where users must charge their vehicles overnight to obtain a full charge. This is a technical issue that the industry is in the process of resolving, chiefly by improving upon today's much-used "plug-in" charging systems. Industry has been looking primarily at moving towards the use of charging plates, or "ground pads," which would allow vehicles to park over a plate and receive a charge through power transfer to a unit mounted on the underside of the vehicle. As an example, BMW is one manufacturer that has rolled out an early ground pad charging system for some of its models.

Charging pads for EVs can work in several ways, using either magnetic induction or magnetic resonance technologies that allow a vehicle to be charged while in contact or in near contact with the power source. For EVs, the push is to develop "through the air" charging using higher levels of radio frequency (RF) energy, which would allow a vehicle positioned over a charging plate to be powered much more quickly. The automotive industry has been developing uniform standards and guidelines for this higher "Level 3" charging wireless charging capacity. Thus far, the Society of Automotive Engineers International (SAE) has developed design standards. The International Telecommunications Union (ITU) is working on international regulations for the use of radio spectrum for wireless charging of EVs, which would operate on radio frequencies below 100 kHz (in particular, 79 to 90 kHz). And the American National Standards Institute (ANSI) is creating measurement standards to be used to demonstrate the safety of wireless charging systems.

Allowing these new Level 3 wireless charging technologies into the U.S. marketplace is not without regulatory hurdles. The Federal Communications Commission (FCC) regulates the use of radio frequencies generally, and sets certain standards for the design of equipment that transmit wirelessly. As part of this role, the FCC also issues requirements for RF safety, establishing how manufactures must measure and protect against potential harm to human health from wireless devices. All of this means that any new and innovative technologies that emit RF energy are reviewed closely before they are allowed into the U.S. marketplace.

The FCC now is considering what rules it may adopt to authorize the sale of more powerful wireless charging systems for EVs. The FCC is acting in response to a petition from a group of automakers (Toyota, Ford, BMW and Nissan), which seek a modification to the FCC's rules to allow for charging of light-duty vehicles at power levels higher than what the FCC presently allows. Rules proposed by these automakers would harmonize the U.S. rules with the developing international standards mentioned above, opening the door to Level 3 wireless charging for EVs in the U.S.

Regulatory changes to allow for Level 3 wireless charging technologies should greatly improve customer acceptance of EVs, and therefore the business case for EVs sold in the United States. The FCC will be collecting comments on the proposed new rules this year (dates yet to be announced), and those in the electric vehicle industry will want to follow the FCC's proceeding to ensure that their business planning aligns with any likely regulatory changes.

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