

# **EXHIBIT Y**

**VANDERBILT UNIVERSITY**



TO: Audi CO2 Cy Pres Settlement Fund

### **Uptake and Effects of Electric Vehicles in Urban and Rural Areas in the Southeast**

Electrification of transportation is accelerating in the United States, and it has important implications for air pollutant emissions, environmental justice and human health. Understanding the uptake and effects of electrification is particularly important in the Southeast where much of the domestic manufacturing of electric vehicles (EVs) and batteries is taking place and where state governments are not aggressively promoting EV adoption. This initiative will develop policy-relevant research results regarding barriers to wider EV adoption in Nashville and the Southeast. The overall research initiative will be led by Professor Michael Vandenberg (<https://law.vanderbilt.edu/bio/michael-vandenberg/>), who has published widely on legal and social science issues regarding energy and climate behavior and is one of the two dozen most frequently cited law professors in the peer reviewed literature.

*Project 1: Health Effects of EVs.* The first project will address the lack of understanding and data about the specific human health benefits that can occur from EVs, especially in inner-city and environmental justice neighborhoods. Motor vehicles are an important source of air pollutants that cause asthma and other human health harms, but in the absence of specific information about these health effects policy makers cannot adequately assess and support EVs. This research team will be led by Dr. Tina Hartert (<https://medicine.vumc.org/person/tina-v-hartert-md-mph/>), a leading respiratory epidemiologist and the Director of Vanderbilt's Center for Asthma and Environmental Sciences Research. The data on motor vehicle emissions for the project will be made available by the Metro Government and data analysis will be conducted by Dr. Hartert's team as well as the team of Prof. Abhishek Dubey (<https://my.vanderbilt.edu/dabhishe/>) at the Vanderbilt Institute for Software Integrated Systems, which develops analysis, scheduling and optimization algorithms for mixed transit fleets that include electric, hybrid and diesel vehicles. The research team also includes leadership from Leah R. Alexander, PhD, MPH (<https://www.mmc.edu/research/researcher-profiles/alexander-leah.html>), an associate professor in the Division of Public Health Practice, Meharry Medical College, a Nashville-based health sciences center with a focus on health equity.

The research will identify the specific types of human health risks that can be avoided by replacing fossil fuel vehicles with EVs (e.g., buses, trucks, cars, and motorcycles) in Davidson County (Nashville, Tennessee). The research will harness the resources and expertise of the Environmental influences on Child Health Outcomes (ECHO) program, a National Institutes of Health-funded effort that focuses on health effects in existing maternal-child populations and takes advantage of clinical research networks and technological advances. The mothers and children enrolled in many of the ECHO cohorts already have EPA and census data linked with longitudinal and health outcomes data. The ECHO program research focuses on five key maternal-child outcomes that have a high public health impact: pre-, peri-, and postnatal outcomes; upper and lower airway disease such as asthma and allergies; obesity;

neurodevelopment; and positive health. As pollutants that cause airway inflammation enhance risk for respiratory viral infections, it is likely that EVs might protect from both risk for infection and severity of infection. Thus, in addition, the research will examine whether wider use of EVs may reduce the risk of respiratory viral infections such as the novel coronavirus that causes COVID-19 (SARS-CoV-2), influenza, and respiratory syncytial virus (RSV), the major cause of infant respiratory morbidity and mortality worldwide.

In short, the funded research will examine how electrifying transportation will reduce air pollutant emissions from each major type of vehicle, how those emissions reductions will reduce exposure to air pollutants, and how reduced exposure will affect these types of health outcomes in Nashville. The work will have implications for the impact of EV adoption not only on local air-quality, health, and equity, but also on electricity resource usage. Although the research will focus initially on the Nashville area, it will lay the foundation for similar efforts, including NIH ECHO consortium cohorts across the US, and statistical and machine learning models, which will be valuable for understanding EVs in the Southeast and around the US. This work will also inform public health expectations for asthma and respiratory health preventive strategies.

Total Cost: \$250,000/year for 3 years

*Project 2: Uptake of EVs in a Polarized Region.* In addition to a lack of understanding about the health benefits of EVs, a second barrier to electrification of transportation is the lack of understanding about the factors that affect acceptance of EVs in rural, suburban, and urban areas. Research demonstrates that with the increasing political polarization in the US many types of beliefs and behavior are strongly influenced by worldview or identity. This is particularly true regarding climate change and other environmental issues. Prof. Vandenberg's research team will examine the drivers of support for the uptake and use of EVs among populations with large numbers in the Southeast, including rural, suburban, and inner-city communities. For instance, widespread acceptance of EVs in rural areas may require that rural populations not view EVs as the type of vehicle that urban or coastal elites drive. The research will examine whether the availability of EV models that are popular among rural populations, such as pickup trucks, and other forms of information may affect identity-based resistance to EVs in these populations. Similarly, the research will examine the influences on uptake and use of EVs among rural and urban populations who identify as Black, Indigenous, or People of Color. Expertise in social science research will be provided by two new Vanderbilt post-doctoral fellows in social psychology, Jennifer Cole and Ash Gillis, and by Prof. Mark Cohen (<https://business.vanderbilt.edu/bio/mark-cohen/>) and Prof. Jonathan Gilligan (<https://my.vanderbilt.edu/jonathangilligan/>).

Total Cost: \$125,000/year for 2 years

Disclosure: In addition to being a law professor, Prof. Vandenberg is a member of the Electric Power Board (uncompensated), which serves as the board of directors for the Nashville Electric Service, the local distributor of electricity in the Nashville area.