



CENTER FOR ADVANCING RESEARCH IN
Transportation Emissions, Energy, and Health
A USDOT University Transportation Center

Federal Agency: Office of the Assistant Secretary for Research and Technology
US Department of Transportation

Federal Grant Number: 69A3552348329

Project Title: Center for Advancing Research in Transportation Emissions,
Energy, and Health (CARTEEH)

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Submission Date: October 30, 2024

DUNS & EIN Numbers: 93-848-5539; 74-2270624

Recipient Organization: Texas A&M Transportation Institute
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Recipient Identifying Number: 617981; 165824

Grant Period: June 1, 2023 – May 31, 2029

Reporting Period End Date: September 30, 2024

Report Term: Semi-Annual

Signature of Submitting Official:

OVERVIEW

The Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) received a U.S. Department of Transportation (USDOT) grant for a Tier 1 University Transportation Center (UTC) in 2023 under the Bipartisan Infrastructure Legislation (BIL) UTC program. This grant builds on a previous grant awarded from the 2016 Fixing America’s Surface Transportation Act UTC Competition. CARTEEH will address transportation emissions, energy, and health with a focus on advancing health equity and the engagement of underserved communities. Under this grant, the CARTEEH consortium has expanded with the addition of two partners who offer expertise on health equity and engagement of disadvantaged communities, the Morehouse School of Medicine and North Dakota State University. These new partners join the existing consortium members, the Texas A&M Transportation Institute (TTI)/Texas A&M University (lead institution), Georgia Institute of Technology, Johns Hopkins University, University of California at Riverside, and the University of Texas at El Paso.



Figure 1. CARTEEH Consortium Members

1. ACCOMPLISHMENTS

Major Goals of the Program

CARTEEH’s work will support the United States Department of Transportation’s Strategic Plan goals of equity, climate, and sustainability. Equity will be addressed as we tackle the disproportionate impact of air pollution on poorer communities and communities of color, who



are also often underserved in terms of access to transportation and health-promoting opportunities. We will also address climate and sustainability issues through the linkages of pollutant emissions to greenhouse gases, climate change, and decarbonization. Our work, which will revolutionize research, education, and technology transfer in this area, will also support the goal of transformation.

The following sections provide a high-level discussion of activities in-progress and planned during this reporting period under the goal areas of research, education, and technology transfer, which we will continue to build on during future reporting periods of this grant.

CARTEEH Goal #1: Research Program

Continuation of Collaborative Research Projects

In this reporting period, CARTEEH consortium members continued the seven collaborative projects (one led by each consortium member) that are detailed in Table 1.

Table 1. Initial Collaborative Projects

Project #1—Electric versus Internal Combustion: What are the Actual Emissions and Health Impacts?	
Lead: Texas A&M Transportation Institute/Texas A&M University	Collaborators: GT, JHU, UCR
<i>Motivation: EVs are changing the transportation landscape. Deployment of electric buses to replace diesel school buses has the potential to reduce exposures of a vulnerable population but must be studied from a comprehensive life-cycle perspective.</i>	
Project #2—Integrated Transportation-Health Modeling Platform for Decision-Support	
Lead: Georgia Institute of Technology	Collaborators: TTI/TAMU, JHU, UCR
<i>Motivation: The “transportation emissions to health” modeling chain is traditionally resource-intensive and computationally complex. This project aims to create a modeling platform that balances analytic rigor with practical feasibility, resulting in a tool that is of practical applicability to transportation stakeholders.</i>	
Project #3—Health Risks for Vulnerable Transit Users	
Lead: John Hopkins University	Collaborators: GT, UTEP, NDSU
<i>Motivation: Transit users are often economically disadvantaged relative to drivers of private vehicles and often face health risks pertaining to air quality and exposure to emissions, as well as other areas. This project will address health disparities by considering the emissions exposure of students who take transit to school in Baltimore.</i>	
Project #4—Transportation and Health Equity: Tools for Community Engagement	
Lead: Morehouse School of Medicine	Collaborators: UTEP, NDSU, TTI/TAMU
<i>Motivation: Engagement of historic and current underserved communities is a critical element of promoting health equity in transportation and promoting community-centered decision-making. This project uses dissemination and implementation research methods for a unique application in the</i>	



<i>metropolitan Atlanta region to develop an equity framework and community-engagement tools for transportation planners.</i>	
Project #5—Low-Emissions Technologies for Tribal and Rural Communities	
Lead: North Dakota State University	Collaborators: TTI/TAMU, MSM, UCR
Motivation: <i>Often, new technologies and advances in transportation are not readily accessible to all, resulting in their benefits being unavailable to several underserved communities, such as in rural and tribal areas.</i>	
Project #6—Mitigating Freight Emissions in EJ Communities in and Around Ports	
Lead: University of California, Riverside	Collaborators: UTEP, MSM, GT
Motivation: <i>The heavy-duty vehicle sector, associated with freight movement, is outpacing light-duty vehicles in growth and contribution to mobile source emissions. Communities near port areas are shown to be disproportionately impacted by freight emissions.</i>	
Project #7—Air Quality Monitoring for Vulnerable Communities	
Lead: University of Texas at El Paso	Collaborators: JHU, MSM, NDSU
Motivation: <i>Community-based monitoring can help provide localized data to empower communities and provide them with information on the impacts of transportation on their environment, in terms of air quality, noise, and beyond, and to develop strategies to mitigate the health impacts.</i>	

Some highlights of progress on each research project are as follows:

- Electric versus Internal Combustion: What are the Actual Emissions and Health Impacts?** – Researchers at TTI collected statewide school bus operating data from the Texas Education Agency and other relevant sources to conduct a lifecycle greenhouse gas (GHG) assessment. A research paper based on this work was developed and submitted to the Transportation Research Board Annual Meeting, where it was accepted and will be presented in January 2025. Additionally, the team established a research partnership with the Austin Independent School District (AISD) to measure air quality inside electric and diesel school buses within their fleet in Mid-November 2024.
- Transportation and Health Equity: Tools for Community Engagement** – In this study, the team at Morehouse School of Medicine continued to work with stakeholders including the Atlanta Neighborhood Planning Unit Program Manager (meetings in May 2024 and August 2024), and the City of Atlanta’s Department of Transportation’s Strategy and Planning Team (August 2024) and are having ongoing discussions on collaboration with the Atlanta Regional Commission including regarding GIS mapping and data analysis. A needs assessment was developed for NPU leaders and residents.
- Low-Emissions Technologies for Tribal and Rural Communities** – In this reporting period, the research team at North Dakota State University conducted additional literature review on the use of propane transit buses. A survey was conducted of rural and tribal transit agencies regarding their use of alternative fuels, hybrid vehicles, and electric vehicles. A paper was written, submitted, and accepted for presentation at Transportation Research Board Annual Meeting summarizing the results of the survey. A list of rural and tribal communities implementing micro-transit and ride-sharing



operations was compiled, and a survey/interview was designed to be conducted of agencies operating these services.

- **Health Risks for Vulnerable Transit Users** – In this period, the study team at Johns Hopkins University completed administrative arrangements for the study, notably the Memorandum of Understanding between the Baltimore City Public Schools (BCPS) and the Johns Hopkins Bloomberg School of Public Health and was fully executed on September 5, 2024. The MOU is necessary to facilitate data sharing. BCPS is facing challenges with deployment of electric buses and has support from the World Resources Institute for related efforts. A revised schedule will be developed in collaboration with BCPS working around the current issues faced that have caused project delays.
- **Integrated Transportation-Health Modeling Platform for Decision-Support** - The research team at Georgia Tech completed the integration of MOVES-MATRIX 4.0 and the integration of MOVES-Matrix with AERMOD. The team is producing near-road hourly pollutant concentration fields for the entire Metro Atlanta region using modeled vehicle activity. The team is planning to demonstrate how the same tool can be used with real-time monitored vehicle data for Atlanta’s Northwest Corridor, via a data partnership with the State Road and Tollway Authority. To close out the Year 1 modeling demonstration for CARTEEH, the team will take the elements developed for the separate projects and estimate the combined pollutant and heat exposure for the transit riders. All of the modeling tools are being fully documented and will be released via GitHub as part of tech transfer activities.
- **Air Quality Monitoring for Vulnerable Communities** – The research team at the University of Texas at El Paso completed a literature review of available software using U.S. EPA’s mapping and screening tool for identifying and ranking vulnerable communities and will use this to identify a city which is not considered vulnerable as a control site for data collection; purchased 10 SLM-25 Noise Sensors that will be used to continuously monitor outdoor noise levels, with the goal of integrating noise pollution studies into our existing pollutant sensors; they also tested the Clarity Node-S air quality sensor after a 3-month evaluation of corrected sensors and found that the corrected data agreed very well with the observations at a fixed station, additionally comparisons were made by relocating the field sensors to another reference station. The data reported by the low-cost sensors agree well with the data reported by a federal equivalent method (FEM) monitoring instrument at the new location. It is our belief that the data quality for a set of low-cost sensors could be further improved when the correct relationship is being revised continuously using prolonged collocated data recorded at a fixed station. Further data will be reported after a network of low-cost sensors is installed in the Paso del Norte air basin.
- **Mitigating Freight Emissions in EJ Communities in and Around Ports** – The study team at University of California-Riverside developed a modeling suite for estimating truck travel demand, activities, emissions, and the amount of truck emissions inhaled by residents in Southern California. This modeling suite allows for an understanding of the impact of freight transportation on not only environmental justice communities in and



around ports but also those near any freight facilities (e.g., railyards, warehouses, distribution centers) in the region.

Pending Release of Year 2 RFP

The competitive request for proposals for projects has been drafted and will be released in the next reporting period, with new projects to be issued by all consortium members for a targeted start date of January 1, 2025. As discussed in the previous report, the focus of new projects will be on the thrust areas of 1) Integration of Disciplines, 2) Advancing Health Equity, 3) Addressing Broader Impacts of Transportation, 4) Addressing Technologies and Disruptors.

Continuation of “Healthy Mobility” Cross-Cutting Project

During this reporting period, the TTI team at CARTEEH continued the development of a strategic research project concept centered around the topic of “healthy mobility”. Some ideas to re-align this initiative were put forward as an outcome of discussions at the Future of Transportation summit and other discussions over the course of this reporting period. These are being taken into account before finalizing the approach and work plan.

Research Results Disseminated

As outlined in the technology transfer section and in the research updates, as projects have progressed, research results have been selected for showcase at upcoming events like the Transportation Research Board Annual Meeting and other conferences.

Plans for Next Reporting Period to Accomplish Research Goal

In the next reporting period, the collaborative projects will be continued in line with their work plans, along with the initiation of several new research projects.

CARTEEH Goal #2: Education and Workforce Development

Under education and workforce development, CARTEEH will continue to mentor the future transportation workforce and train and inform practitioners. Our programs include research assistantships and summer internships for university students and programs for high schoolers and community health workers. Some notable initiatives during this reporting period include:

CARTEEH Summer Internship Program

CARTEEH’s annual Summer Internship program kicked off on May 28, 2024, and concluded on August 2, 2024. This program was held jointly with the internship program for the National Center for Infrastructure Transformation (NCIT) and Southern Plains Transportation Center (SPTC).



Four upper-level undergraduates interested in transportation emissions, energy, and health spent 10 weeks in the CARTEEH offices this summer. They participated in professional development activities, technical tours, and research presentations throughout the summer. Each intern took on a chosen research topic under the guidance of a TTI researcher serving as their mentor. The interns presented their research at TTI's Hall of Honor Conference room (Figure 2). The CARTEEH interns included Neha Alluri (Computer Science Major from Rutgers University), Austin Gardner (Planning Major from UT-Austin), Christian Moreno (Urban Planning Major from Texas A&M University) and Naomi Sasser (Environmental Studies Major at Texas A&M University). Links to their final presentations can be found on the following page, <https://www.carteeh.org/carteehs-2024-summer-undergraduate-research-internship-program/>.



Figure 2. CARTEEH and other UTC summer interns at their final presentation (Pictured (left to right): Neha Alluri, Jacob Nolte, Christian Moreno, Kaleigh Spears, Mahshid Malazizi, Teale Robison, Austin Gardner, Naomi Sasser and Carly Loe).

Student Involvement

In addition to our flagship internship program, several students are engaged as part of ongoing projects. In this reporting period, CARTEEH projects across the member institutions involved three undergraduate students, two master's students, and thirteen doctoral students, from different majors as shown in Table 2.



Table 2. Students involved in CARTEEH Activities in this Reporting Period (Outside of Summer Internship Program)

Academic Level	Number of Students	Program of Study/Major
Bachelor's	2	Civil Engineering
Bachelor's	1	Education
Master's	1	Civil Engineering
Master's	1	Master of Public Health
Ph.D.	2	Curriculum and Instruction
Ph.D.	2	Education
Ph.D.	6	Civil Engineering/Civil and Environmental Engineering
Ph.D.	2	Electrical and Computer Engineering
Ph.D.	3	Transportation and Supply Chain

Plans for Next Reporting Period to Accomplish Education and Workforce Development Goal

For the next reporting period, the team will continue to expand on the involvement of students in CARTEEH center activities. Some focus areas include recruitment of students for student-led projects at Georgia Tech, and the creation of a new internship program for high school students for summer 2025. UCR will also co-sponsor the annual Science and Technology Education Partnership Conference (STEPCon) for K-12 students and teachers throughout Riverside County and the nearby areas, scheduled to be held on October 10th, 2024. Other activities include work on updating and enhancing the CARTEEH curriculum, including possible adaptations for practitioners, and continuing our collaborative efforts with Texas A&M University's College of Education and Human Development.

CARTEEH Goal #3: Technology Transfer and Collaboration

In this reporting period, several activities related to technology transfer and collaboration were initiated and continued by members of the CARTEEH consortium. CARTEEH Leadership also held periodic meetings (on April 17, 2024 and September 9, 2024) to monitor progress of all consortium members and ensure collaboration and discussion of center activities.

CARTEEH Presence at the Future of Transportation Summit

CARTEEH had a robust presence at the Inaugural Future of Transportation (FoT) Summit in Washington, DC which was organized by the University Transportation Centers program of the US Department of Transportation. The CARTEEH Director, Dr. Joe Zietsman spoke on "Advancing Healthy Mobility through Interdisciplinary Research" as part of the Environmental Plenary Session. Other members of CARTEEH's leadership team, including Dr. Tara Ramani, Dr. Jeremy Mattson, and Dr. May Fox participated in the conference.



In addition to the plenary presentation, CARTEEH had three posters for display and presentation in the atrium of the US DOT HQ during the FoT Summit:

- Low Emissions and Clean Transit in the Rural and Tribal Context – *Dr. Jeremy Mattson*
- Supporting the Future of Transportation Through Research and Student Experiences – *Dr. Mary Fox*
- Transportation Electrification: Trucks, Freight, and Beyond – *Dr. Tara Ramani and Dr. Kanok Boriboonsomsin*



Figure 3. Dr. Joe Zietsman presenting on “Advancing Healthy Mobility through Interdisciplinary Research” at the Future for Transportation Summit held in Washington, DC, August 13-15, 2024.

CARTEEH Participation in the Council of University Transportation Centers (CUTC) Summer Meeting and EU-US Decarbonization Summit

CARTEEH leadership represented the center and participated in two nationally significant events in June 2024. The first was the Transportation Research Board and National Academies Seventh EU-US Transportation Research Symposium on “*Global Pathways to Net-Zero: Social, Behavioral, and Technological Research and Innovation Strategies for Transportation Decarbonization*”. Dr. Joe Zietsman, CARTEEH Director, at the invitation of symposium organizers, participated in this summit along with other UTC Directors operating in this area.

In a concurrent event, Dr. Tara Ramani, Deputy Director of CARTEEH, was invited to speak about CARTEEH’s success in advancing interdisciplinary research at the Council of University



Transportation Centers (CUTC) Summer Meeting in South Padre Island, Texas. Dr. Ramani spoke on June 10, 2024, at a panel on “The Lasting Effects on UTC Grants”. Dr. Ramani also represented CARTEEH at the rest of the event and participated in all the collaborative activities and tours.

CARTEEH Seminar/Webinar: Transportation Emissions Research and Regulations in the Face of Rapid Technological Change

On June 7, 2024, CARTEEH hosted Dr. Imad Khalek of the Southwest Research Institute (SwRI), an expert in the area of vehicle emissions and emerging issues. Dr. Khalek presented a seminar to CARTEEH researchers, faculty, and students, which was simulcast as a webinar. Dr. Khalek discussed the forces that are competing in the light-duty and heavy-duty landscape of our transportation sector to reduce emissions. Dr. Khalek went on to discuss how tailpipe emissions have been drastically reduced over the years and how new regulations are continuing to push for further reductions in particulate matter (PM) mass and nitrogen oxides (NOx), addressing some of the remaining challenges that have public health implications. Additionally, he covered brake and tire particle emissions and their contributions to PM10 and PM2.5. Finally, Dr. Khalek briefly touched on electric vehicle battery fires and the significant emissions produced from a single event. A link to the presentation can be found here, <https://www.carteeh.org/wp-content/uploads/2024/06/Transportation-Emissions-Research-and-Regulations-Imad-Khalekl.pdf>. The event was very well attended with over 70 participants in person and online.

CARTEEH Seminar/Webinar: Vehicular Non-Exhaust Emissions Research in California: Understanding the Characteristics of the Emissions

CARTEEH hosted a visit from Dr. Seungju Yoon of the California Air Resources Board on September 18, 2024. Dr. Yoon oversees mobile source research programs at the California Air Resources Board, and he interacted with CARTEEH researchers to discuss several related topics. Dr. Yoon also presented a seminar/webinar on non-exhaust emissions research.



Figure 4. Dr. Seungju Yoon (CARB) with CARTEEH Leadership and Other Collaborators (Pictured L-R Qi Ying, Tara Ramani, Joe Zietsman, Seungju Yoon, Sandeep Kishan, Madhu Venugopal)



The presentation covered the characteristics of brake- and tire-wear emissions and related investigations by the California Air Resources Board to characterize airborne non-exhaust PM emissions and their potential health effects. A link to the webinar recording can be found here, <https://www.carteeh.org/vehicular-non-exhaust-emissions-research-in-california/>. The event was extremely well attended with over 90 participants in person and online, and a robust facilitated discussion and Q&A following the event.

CARTEEH Director Visit to Southern Plains Transportation Center (SPTC)

During a visit to partners in Oklahoma and New Mexico for other research initiatives, Dr. Joe Zietsman, CARTEEH Director, had the opportunity to visit SPTC, a regional UTC led by the University of Oklahoma. Dr. Zietsman presented about CARTEEH research and discussed possible collaboration opportunities with SPTC Director Dr. Musharraf Zaman and his colleagues.



Figure 5. Dr. Joe Zietsman speaking to SPTC UTC about CARTEEH and other research

CARTEEH Involvement with UBDPolicy Workshop

The Urban Burden of Disease Estimation for Policy making (UBDPolicy) project (<https://ubdpolicy.eu/>) is an EU-funded initiative aimed at enhancing the estimation of health impacts and socio-economic costs or benefits associated with air quality, noise, urban green space availability, heat and temperature, physical activity, and inequity across nearly 1,000 European cities. The project monitors three-year trends and assesses the impacts of urban and transport planning as well as environmental policies. It also seeks to advance methodological approaches and promote their adoption as best practices for urban areas, thereby strengthening evidence-based policymaking at city, national, and regional levels.

CARTEEH researcher Dr. Haneen Khreis is on the team of project partners, leading work packages, including one focused on selecting exposure and dose-response functions for policy-oriented health impact assessments. On September 23 and 27, 2024, Dr. Khreis and collaborators organized a two-day workshop to discuss recent advancements, ongoing challenges, and future directions regarding exposure-response functions and their use in health impact assessments. This workshop provided a dynamic forum for an international, cross-disciplinary group committed to advancing the urban health agenda for transportation and beyond. The list of participating organizations were: University of Cambridge, Texas A&M Transportation Institute, Barcelona Institute for Global Health, Utrecht University, University of Copenhagen, Swiss Tropical and Public Health Institute, Max Planck Institute for Chemistry, London School of Hygiene and Tropical Medicine, Queen's University of Belfast, University of Leicester, National Research Council, Italy, Imperial College London, Air Quality Consultants LTD, Born in Bradford, Finnish Institute for Health and Welfare, Norwegian Institute of Public Health, Medical University of Plovdiv, and Netherlands National Institute for Public Health and



the Environment, University of Colorado Denver, Clemson University, University of Louisville, Boston University, Columbia University, Health Effects Institute, Logicka Group, Oregon Health & Science University and the Portland State University School of Public Health, University of Arizona, University of Utah. U.S. Environmental Protection Agency and the U.K. Health Security Agency.

Technology Transfer and Collaboration Results Disseminated

The above activities have resulted in outreach and dissemination of CARTEEH’s activities to our stakeholders and mailing lists, and through our conversations at various professional conferences and events.

Plans for Next Reporting Period to Accomplish Technology Transfer and Collaboration Goal

In the next reporting period, we will continue on several technology transfer activities. Some of the plans include finalizing a date for the CARTEEH Symposium and initiating symposium planning (tentatively scheduled for October 2025), continuing webinars, seminars, and other activities including events as part of the Clean Transportation Collaborative (CTC). This next reporting period will also feature a visit from Dr. Firas Ibrahim, Director of the Office of Research, Development and Technology at OST-R, and colleagues to CARTEEH, that plans are currently underway for.

2. PARTICIPANTS AND COLLABORATING ORGANIZATIONS

Organizations Involved as Partners

The CARTEEH consortium is a seven-member consortium led by the Texas A&M Transportation Institute (TTI)—part of The Texas A&M University System. Other members include The University of Texas at El Paso, Johns Hopkins University, Georgia Technology University, University of California at Riverside, Morehouse School of Medicine, and North Dakota State University. The team members from the various partner universities have begun to collaborate on their projects and are refining plans for other CARTEEH activities.

Other Collaborators and Contacts

The tables below provide a list of organizations (Table 2) and individuals (Table 3) our consortium members interacted substantively in the context of CARTEEH activities during this reporting period.

Table 3. Organizations Interacted with During the Reporting Period on CARTEEH Related Activities

Organization Name	Location	Contribution
UT Health School of Public Health	El Paso and Houston, Texas	Community engagement and outreach
Baltimore City Public Schools	Baltimore, MD	Collaboration



Science and Technology Education Partnership	Riverside, CA	Collaborate on hosting STEPCon 2023 conference
Southern California Association of Governments	Los Angeles, CA	Share regional travel demand model data for use in the CARTEEH research project
IEEE Intelligent Transportation Systems Society	USA	Collaborate on hosting FISTS 2024 conference
Atlanta Neighborhood Planning Units	Atlanta, GA	NPU leaders and NPU University
City of Atlanta Department of Transportation- Strategic Planning Team	Atlanta, GA	Strategic Planning on Health Equity and Transportation
North Central Texas Council of Governments	Arlington, TX	Collaboration
Houston-Galveston Area Council	Houston, Texas	Collaboration
Texas Department of Transportation	Austin, Texas	Collaboration
Peterbilt Motors	Denton, Texas	Collaboration
Southern Plains Transportation Center	Norman, Oklahoma	Coordination with related UTC
National Center for Infrastructure Transformation (NCIT)	Prairie View, Texas	Coordination with related UTC
National Center for Sustainable Transportation (NCST)	Davis, California	Coordination with related UTC
Eastern Research Group	Austin, Texas	Collaboration
California Air Resources Board	Sacramento, California	Seminar
Atlanta Regional Commission	Atlanta, GA	Transportation data and GIS
Barcelona Institute for Global Health	Barcelona, Spain	Collaboration via UBDPolicy Workshop
Cambridge University	Cambridge, UK	Collaboration
Georgia Community Health Worker Network	Atlanta, GA	CHW recruitment and transportation training
City of Dallas	Dallas, TX	Air monitoring collaboration
Austin Independent School District	Austin, TX	School bus electrification collaboration
Texas Department of Transportation	Austin, TX	Collaboration
Health Effects Institute	Boston, MA	Collaboration
UT Health School of Public Health	El Paso and Houston, Texas	Community engagement and outreach



Table 4. Individuals Interacted with During the Reporting Period on CARTEEH Related Activities

Name	Affiliation (institution & location)	Contribution
Jayajit Chakraborty	University of California Santa Babara	Identification of Vulnerable Community
Leah Whigham	UT Health School of Public Health	Community outreach
Juan Aguilera	UT Health School of Public Health	Community outreach
Yun Hang	UT Health School of Public Health	Air quality data analysis
Joanna Pi-Sunyer	Baltimore City Public Schools	Collaboration (ongoing)
Richard Baldauf	USEPA	Collaboration
Nigel Clark	West Virginia University (Emeritus Appointment)	Collaboration
Karl Ropkins	University of Leeds	Development of future research ideas
Timothy Shepherd	Maryland Department of the Environment	In-kind support
Prof. Will Porter	Department of Environmental Science, UCR	Contribute expertise in chemical transport model towards the integrated air quality modeling developed in the CARTEEH research project
Imad Khalek	Southwest Research Institute	Collaboration and seminar
Musharraf Zaman	University of Oklahoma	Collaboration on climate and other related topics
Lisa Losada Rojas	University of New Mexico	Collaboration on safety related topics
Heng Wei	University of Cincinnati	Collaboration on GHG emission related topics
Qi Ying	Texas A&M University	Collaboration – modeling topics
Johnathan Snodgrass	Texas A&M University	Collaboration – Electric vehicles and smart charging
Kris Hazafizadeh	Austin ISD	Collaboration on Electric School Bus Project
Chris Klaus	North Central Texas Council of Governments	Discussed potential research projects
Seungju Yoon	California Air Resources Board	Collaboration and seminar

3. OUTPUTS

The CARTEEH website (www.carteeh.org) continues to be updated. The TRB Research in Progress (RIP) database has also been updated to include all current CARTEEH projects and will continue to be updated as new items are added.

Journal Publications

Uwak, I., Shields, M., Vallamsundar, S., Ramani, T., Aguilera, J., Li, W. W., ... & Johnson, N. M. (2024). Personal Exposure to Polycyclic Aromatic Hydrocarbons: A Pilot Study of Teachers in El Paso, Texas. *Texas Public Health Journal*, 76(3):21-25. [Personal Exposure to Polycyclic Aromatic Hydrocarbons: A Pilot Study of Tea...: EBSCOhost](#)

Books or Other Non-Periodical, One-Time Publications:

Nothing to report.



Other Publications, Conference Papers, and Presentations

Anqi Wei (2024). Analysis of Drivers' Gap-Acceptance Behavior Using A Drone-Measurement Technique. Dissertation. Georgia Tech School of Civil and Environmental Engineering. March 2024

Godavarthy, Ranjit, Bright Quayson, and Jeremy Mattson. "Low Emission Technologies for Rural and Tribal Transit," TRBAM-25-04335, accepted for 2025 Transportation Research Board Annual Meeting.

Bumsik Kim, Minjie Xu, Christian Moreno, Elizabeth Rhinehart, Madhu Venugopal, Tara Ramani "Electric Vs. Diesel School Buses: Lifetime Greenhouse Gas Emission Comparison" - , accepted for 2025 Transportation Research Board Annual Meeting.

Vazquez L, Chavez M, Li W-W, 2024. Enhanced air quality monitoring in the Paso del Norte region using low-cost sensors, accepted for a presentation at the 2024 Air Sensors International Conference, Apr. 30 - May 3, Riverside, CA.

Vazquez L, Chavez M, Li W-W, 2024. Optimizing data accuracy in low-cost air quality sensors, accepted for a presentation at the 2024 Air Sensors International Conference, Apr. 30 - May 3, Riverside, CA.

Jeremy Johnson, Presentation to the NCTCOG Air Quality and Health Task Force on "Using Non-Regulatory Monitors in Air Quality Projects", July 25, 2024, Dallas, TX.

Tara Ramani, "Aligning Transportation with another and non-traditional discipline", Council of University Transportation Centers Summer Meeting, June 10-12, South Padre Island, Texas.

Chavez M, Williams E, Cheu KR, Li W-W, 2024 air quality measurements of PM, NO₂ and O₃ in a near-highway community using mobile monitoring and stationary continuous monitoring, accepted for a presentation at the 2024 Air Sensors International Conference, Apr. 30 - May 3, Riverside, CA.

Drs. Jeremy Mattson and Ranjit Godvarthy, North Dakota State University, presented "Low Emissions and Clean Transit in the Rural and Tribal Context" at the Future of Transportation Summit held in Washington, D.C., August 13-15, 2024.

Dr. Mayra Chavez presented "UTEP-Paso del Norte Community Foundation's community-based proposal to the EPA's Community Change Grants Program" at the Joint Advisory Committee for the Improvement of Air Quality (CCC/JAC) Meeting held in El Paso, TX on February 20, 2024.



Dr. Mary Fox presented “American Council of Government Industrial Hygienists, Webinar: Current Status of EPA’s Risk Evaluations for Existing Chemicals under TSCA” at the American Council of Government Industrial Hygienists Training Webinar on April 11, 2024.

Dr. Mary Fox along with CARTEEH Investigators presented “Supporting the Future of Transportation through Research and Student Experiences” at the Future of Transportation Summit held in Washington, D.C., held August 13-15, 2024.

Technologies or Techniques

Nothing to report.

Inventions, Patent Applications and/or Licenses

Nothing to report.

4. OUTCOMES

Nothing to report.

5. IMPACTS

Nothing to report.

6. CHANGES/PROBLEMS

Nothing to report.

7. SPECIAL REPORTING REQUIREMENTS

Nothing to report.

