OFFICE OF

NATURAL ENVIRONMENT

U.S. Department of Transportation
Federal Highway Administration
Office of Planning, Environment, and Realty

https://www.fhwa.dot.gov/environment/

FHWA's Office of Natural Environment (HEPN) develops and implements programs and activities to minimize the adverse impact of transportation on the natural environment.

The Federal Highway Administration's (FHWA) Office of Planning, Environment, and Realty offers research opportunities to improve transportation decision making and promote efficiency while protecting communities and the environment. The Office supports and conducts research that:

- Informs Decisions
- Reduces Environmental Impacts
- Improves Quality of Life
- Accelerates Project Delivery
- Advances Transportation Planning

Research Focus

The Office of Natural Environment conducts comprehensive research to support the development and implementation of programs and activities that enhance sustainability, improve resilience, and reduce energy use, air quality impacts, and noise impacts on our highway system. Programs and activities include the Congestion Mitigation and Air Quality Improvement (CMAQ) program, transportation conformity, analysis and assessment of air quality, resources to support climate resilience and implementation of the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program, highway traffic noise, and programs to support the development of alternative fuel corridors including the National Electric Vehicle Infrastructure (NEVI) Programs and the Charging and Fueling Infrastructure (CFI) Discretionary Grant Program.

Staff Contact: Connie Galloway, 804-775-3378.

FEATURED RESEARCH ACTIVITIES

CMAQ Emissions Calculator Toolkit

The CMAQ Emissions Calculator Toolkit contains spreadsheet-based tools to assist State Departments of Transportation (SDOTs), Metropolitan Planning Organizations (MPOs) and project sponsors to generate emissions benefit information for potential CMAQ projects. A total of 17 modules are now available, representing over 45 individual project types. Each of the Emissions Calculator Tool postings is accompanied by thorough documentation on tool usage and a training webinar recording. Additional tools are being developed to address other project types including teleworking, pricing, and Port and Intermodal related projects.

Staff Contact: Mark Glaze, 202-366-4053.

National Highway Institute (NHI) Training on Climate Resilience

FHWA developed a new instructor-led training course, Addressing Resilience in Highway Project Development & Preliminary Design, and four companion web-based training courses focused on resilience to climate change and extreme weather events. The target audience includes engineering, project planning and environmental staff, and others seeking to integrate climate change considerations into their practices.

Staff Contact: Rob Kafalenos, 202-366-2079.

Nature-Based Techniques for Coastal Highway Resilience: Implementation Lessons Learned

Natural infrastructure such as dunes, wetlands, living shorelines, reefs, and beaches can protect highways from coastal flooding while offering environmental benefits. FHWA followed-up with former pilot project participants and other transportation agencies that had considered nature-based solutions and developed brief resource summarizing implementation lessons learned to support other agencies considering such resilience solutions.

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Climate Change Resilience Handbooks

FHWA change affects all aspects of the national transportation system. Planners, engineers, and asset managers need to know how to address the impacts of climate change in their work to make transportation systems more resilient to current and future environmental risks. Three new handbooks from the FHWA are designed to support a range of disciplines by providing technical information, techniques, best practices, and results of peer exchanges.

- Addressing Resilience to Climate Change and Extreme Weather in Transportation Asset Management (April 2023)
- Pavement Resilience: State of the Practice (March 2023)
- Geohazards, Extreme Weather Events and Climate Change Resilience Manual (February 2023)

Staff Contact: Rob Kafalenos, 202-366-2079.

Air Quality Modeling Refinements

FHWA is engaged in numerous efforts to support improvements to dispersion modeling techniques. This includes testing of AERMOD source types and evaluation of AERMOD, evaluating dispersion algorithms, special roadway configurations, and vehicle induced turbulence algorithms. Additional research areas include source configuration and urban adjustment factors. Part of this research is conducted in partnership with the Environmental Protection Agency.

Staff Contact: Victoria Martinez, 787-771-2524.

Database for Air Quality and Noise Analysis (DANA) Tool and Traffic Noise Model Aide (TNMAide)

FHWA released version 2.0 of the DANA Tool, which combines and processes existing traffic data to produce properly formatted inputs to the EPA's MOVES emissions model. FHWA also maintains the related TNMAide, which is a spreadsheet tool that aids in the determination of the worst noise hour of the day, for use in the FHWA's Traffic Noise Model (TNM), as required by 23 CFR 772. FHWA plans to release DANA version 2.1, which will integrate TNMAide into DANA, in late 2023 or early 2024.

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Noise Research and Data

Throughout 2022 FHWA has been working on the next version of the Traffic Noise Model (TNM version 3.2), which will integrate TNM with the Roadway Construction Noise Model (RCNM). We are also supporting NCHRP research to update the acoustical database for TNM, including the Reference Energy Mean Emissions Level (REMEL) database, and the assignation of sub-source heights. FHWA has completed and will be releasing new research on Quantifying the Benefits of Noise Mitigation for use on other research projects.

Staff Contact: Aileen Varela-Margolles, 305-978-7780.

Alternative Fuels Corridor Program

The Bipartisan Infrastructure Law (BIL) includes provisions for funding alternative fuel corridors including electric vehicle charging, hydrogen, propane, and natural gas fueling infrastructure at strategic locations along major national highways to improve the mobility of passenger and commercial vehicles that use alternative fuels. To date, FHWA has made designations in all 50 States plus the District of Columbia and Puerto Rico in its Alternative Fuels Corridor Program.

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CMAQ Input Data Dictionary

FHWA completed research on the data structure and inputs associated with major emissions estimation processes for CMAQ project eligibility categories. CMAQ eligibility determinations and annual reporting requirements necessitate the ability to create reliable air quality benefit estimates. The estimated emissions benefits also play a key role in the target setting and reporting requirements associated with the CMAQ On-Road Mobile Source Emissions Measure. The CMAQ Input Data Dictionary was recently updated to include information on an additional 130 inputs, resulting in a total of 480 data inputs used to calculate emissions estimates associated with CMAQ eligible projects.

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Innovative Air Quality and Noise Strategies

FHWA conducted research on air quality and noise mitigation strategies at truck freight bottleneck locations by using case studies at the Port of Tacoma, Port of Houston, and Circle Interchange (I-90/I-290) in Chicago. A research report and case study summary sheets are available on the FHWA air quality website. FHWA began research in late 2023 to identify innovative strategies to reduce air quality and noise impacts and create a data collection methodology to summarize the effectiveness and feasibility of these strategies in addressing air quality and noise impacts in the near road environment.

Staff Contact: David Kall, 202-366-6276.

FHWA MOVES3 Sensitivity Analysis

FHWA assessed the sensitivity of U.S. Environmental Protection Agency's (EPA's) MOtor Vehicle Emissions Simulator version 3 (MOVES3), to various inputs. The FHWA air quality website includes a research report and dashboard of results, which may help stakeholders prioritize data collection and assist in interpreting results.

Staff Contact: David Kall, 202-366-6276.

Sustainable Transportation Curriculum for Colleges, Universities, and Transportation Professionals

FHWA has developed a semester-long curriculum to help students and transportation professionals understand and apply the Infrastructure Voluntary Evaluation Sustainability Tool, INVEST. The curriculum introduces students to sustainability principles and transportation, and emphasizes key concepts, indicators, and performance measures. The semester-long course can be taught independently, or in a more inclusive, modular fashion as part of an existing lecture, course, or program. A wide array of teaching and learning materials are available, including course syllabus, lecture plans and slides, reading materials, instructional aids for professors, and real-world applications of INVEST to demonstrate how it can be used to assess sustainability of transportation projects, plans, and programs.

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