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, and highway traffic noise.

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

**FEATURED RESEARCH ACTIVITIES**
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 11 modules are now available, representing over 30 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 Vehicle to Infrastructure Technology, Construction Equipment and Port and Intermodal related projects. Synergistic emissions benefits for groupings of CMAQ projects are also being considered.

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

**Resilience and Durability to Extreme Weather Pilot Projects**
FHWA partnered with State DOTs, MPOs, and other agencies in a pilots to address transportation resilience. The eleven most recent pilot projects include research related to integrating resilience and durability into agency practices, using available tools and resources to assess the vulnerability and risk of transportation projects or systems, and developing resilience solutions and monitoring performance.

**Staff Contact:** Becky Lupes, 202-366-7808.

**Nature-Based Techniques for Coastal Highway Resilience**
Green infrastructure such as dunes, wetlands, living shorelines, reefs, and beaches can protect highways from coastal flooding while offering environmental benefits. FHWA sponsored five pilot projects to assess the potential for such techniques to protect specific locations along coastal roads and bridges, held peer exchanges, and developed an implementation guide to assist agencies developing nature-based solutions.

**Staff Contact:** Elizabeth Habic, 202-366-1701.

**Air Quality Modeling Refinements**
FHWA is engaged in numerous efforts to support improvements to dispersion modeling techniques by evaluating dispersion algorithms, roadside barrier algorithms, and vehicle induced turbulence algorithms. Additional research areas include source configuration, urban adjustment factors and traffic emissions beyond the tailpipe.

**Staff Contact:** Victoria Martinez, 787-771-2524.
**Database for Air Quality and Noise Analysis (DANA) Tool and Traffic Noise Model Aide (TNMaid)***

FHWA recently released the [DANA Tool](#), which combines and processes existing traffic data to produce properly formatted inputs to the EPA’s MOVES emissions model. FHWA also released the related [TNMaid](#), 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.

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

**Noise Research and Data**

The Noise Abatement Inventory for 2017-2019 is now available online. In addition, HEP continues work on publishing the Multimodal Noise Study case studies; and on methods of quantifying the benefits of noise mitigation. These items will be available on our website.

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

**Alternative Fuels Corridor Program**

The FAST Act directed the U.S. DOT to designate corridors for 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 designated segments of 134 Interstates along with 125 US highways/State roads covering 49 States plus the District of Columbia in its [Alternative Fuels Corridor Program](#).

**Staff Contact:** Diane Turchetta, 202-493-0158.

**Infrastructure Carbon Estimator (ICE) v. 2.1**

ICE is a pre-engineering tool that estimates the lifecycle energy and emissions from constructing and maintaining transportation facilities. The original ICE tool was updated as part of a pooled fund study led by the Minnesota Department of Transportation (MnDOT), and supported by several other State DOTs and FHWA. The [new model (Version 2.1)](#) is posted on MnDOT’s website. It incorporates new life cycle research, additional infrastructure elements, and MOVES emissions factors to estimate vehicle operating energy and emissions. Version 2.1 has also been significantly redesigned with an improved user interface.

**Staff Contact:** John Davies, 202-366-6039.

**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 provides background information on approximately 350 data inputs used to calculate emissions estimates associated with CMAQ eligible projects.

**Staff Contact:** Karen Perritt, 202-366-9066.

**Addressing Truck Emissions and Noise at Truck Freight Bottlenecks**

FHWA is conducting 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. The research will provide information to State DOTs and MPOs on the effectiveness and ease of implementation of mitigation strategies for reducing truck emissions and truck noise levels.

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

**Incorporating Health Considerations into Corridor Plans to Put People First**

FHWA updated the [Framework for Integrating Health Considerations into Transportation Corridor Planning](#) and developed 6 new case studies of MPOs, State DOTs and other transportation providers who used the Framework to incorporate health considerations into corridor plans. The Framework tools and information assist transportation agencies in conducting community engagement, forging partnerships, leveraging resources, and garnering support for investments that support healthy outcomes for their community.

**Staff Contact:** Victoria Martinez, (787) 771-2524.

**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.

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