



Federal Aviation Administration

Models - Aviation Environmental Tools Suite

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About the Components

Aviation is a critical part of the economy, providing for the movement of people and goods throughout the world, and enabling economic growth. With projected strong growth in aviation demand and a rising value being placed on environmental quality, there is a compelling need to address the environmental effects of air transportation. In parallel, the traditional aviation environmental modeling focus on only noise or emissions outputs presents a need to better consider noise, air quality, fuel burn, and greenhouse gas emissions interdependencies and their costs and benefits.

The Federal Aviation Administration's Office of Environment and Energy, in collaboration with Transport Canada and the National Aeronautics and Space Administration (NASA), is developing a comprehensive suite of software tools to facilitate thorough consideration of aviation's environmental effects; this effort is known as the Aviation Environmental Tool Suite. The main goal of this effort is to develop a critically needed ability to characterize and quantify the interdependencies among aviation-related noise and emissions, impacts on health and welfare, and industry and consumer costs, under different policy, technology, operational, and market scenarios.

The main components of the Tools Suite are as follows:

- [Aviation Environmental Design Tool \(AEDT\) \(aedt/\)](#)
- [Environmental Design Space \(EDS\) \(eds/\)](#)
- [Aviation environmental Portfolio Management Tool \(APMT\) \(apmt/\)](#)
- [Area Equivalent Method \(AEM\) \(aem_model/\)](#)

Legacy Aviation Environmental Models

- [Emissions and Dispersion Modeling System \(EDMS\) \(edms_model/\)](#)
- [Integrated Noise Model \(INM\) \(inm_model/\)](#)
- [Noise Integrated Routing System \(NIRS\) & NIRS Screening Tool \(NST\) \(nirs_nst/\)](#)
- [System for Assessing Aviations Global Emissions \(SAGE\) \(sage/\)](#)
- [Model for Assessing Global Exposure to the Noise of Transport Aircraft \(MAGENTA\) \(magenta/\)](#)

Aviation Environmental Tool Development

A leading recommendation in the [2004 Report](#) (PDF) to the U.S. Congress on Aviation and the Environment was that “the nation should develop more effective metrics and tools to assess and communicate aviation’s environmental effects.”

A major part of responding to that mandate is to develop a comprehensive suite of software tools that will allow for a thorough assessment of the environmental affects of aviation. The suite shall include the ability to assess interdependencies between aviation-related noise, emissions, and cost values. This is an intensive development effort that involves participation from the US government (FAA and NASA), industry, academia, Transport Canada, and coordination with foreign counterparts through the International Civil Aviation Organization (ICAO) Committee on Aviation Environment Protection (CAEP).

The focus of this development effort is to incorporate the best scientific understanding to advance legacy tool capabilities to better understand the relationship between noise and emissions and different types of emissions. The resulting suite of tools will have use at local, regional, national and international levels — enabling experimentation and feedback at all of these levels; for example, to assess the environmental benefits of air traffic management system modernization alternatives.

The building block of this new suite of software tools is the Aviation Environmental Design Tool (AEDT), which integrates existing noise and emissions models and helps assess interdependencies. Another element of the suite, targeted to the government research community, is an aircraft and engine analysis tool, entitled Environmental Design Space (EDS). To complete the suite of tools an economic analysis capability is under development; also initially targeted for government use, it is the Aviation environmental Portfolio Management Tool (APMT).

While advancing tool capabilities, the FAA recognizes the critical role aviation environmental assessment tools have in the regulatory decision making. Advances

in tool development will not migrate to the public until after completing rigorous validation testing and a user vetting.

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