

Strategic Objective 5.1—Promote Energy Efficiency

Reduce foreign oil dependence and carbon emissions through research and deployment of new technologies, including alternative fuels, and by promoting more energy-efficient modes of transportation.

PERFORMANCE OVERVIEW

The transportation sector accounts for about 70 percent of all petroleum usage in the United States. Consumption of motor gasoline represents about 46 percent of all petroleum consumed. Most transportation activity is based on fossil fuel consumption, which is the largest source of U.S. greenhouse gas (GHG) emissions. About 27 percent of all U.S. GHG emissions are due to tailpipe emissions from transportation activities, and additional emissions are associated with the extraction and refining of fuels, the manufacture of vehicles, and the construction and maintenance of transportation infrastructure. On-road collectively account for approximately 84 percent of domestic transportation emissions, with the remainder coming from domestic aircraft (8 percent), and rail, domestic ships and boats, and pipelines (roughly 2 percent each).

DOT is working across all modes to improve the energy and environmental performance of the transportation sector, including its operations and facilities. The aviation industry has made significant gains in fuel efficiency, with commercial jet aircraft fuel efficiency improvements of 70 percent over the last 40 years. DOT and the U.S. Environmental Protection Agency (EPA) have worked closely with auto manufacturers, the State of California, environmental groups and other stakeholders to promulgate new rules and develop a series of programs to increase fuel economy of the Nation's vehicle fleet. The Department will continue to promote the deployment of advanced vehicle technologies, alternatives fuels and alternatives fuels infrastructure where feasible to reduce energy consumption and GHG emissions of transportation systems.

DOT Operating Administrations (OAs): Federal Highway Administration (FHWA), Federal Aviation Administration (FAA), Federal Transit Administration (FTA), Federal Railroad Administration (FRA), Maritime Administration (MARAD), and Office of the Secretary (OST).

Aviation Energy Efficiency (FAA)

Overview

Environment and energy issues present a significant challenge to aviation and the development of the Next Generation Air Transportation System (NextGen). A critical component to ensure that the economic and social benefits of future air transportation demand are met will be to improve mobility (i.e., increasing efficiency and capacity); however, these enhancements have the potential to be constrained by aviation's environmental effects. The environmental vision for NextGen is to provide environmental protection that allows sustained aviation growth. Noise, air quality, climate, and energy are the most significant potential environmental constraints to increasing aviation capacity, efficiency, and flexibility. Measuring and tracking energy efficiency from commercial aircraft operations allows FAA to monitor improvements in aircraft/engine technology, renewable fuels, operational procedures and air traffic management enhancements in the airspace transportation system. This information provides an assessment of the combined influence on improving energy efficiency and reducing aviation's emission contributions.


Today's aircraft are up to 70 percent more fuel efficient than early commercial jet aircraft. There is growing concern over aviation's impact on the environment and public health, however. Aviation is currently viewed as a relatively small contributor to those emissions that have the potential to influence air quality and global climate. Carbon dioxide (CO₂) emissions are a primary GHG and are directly related to the fuel burned during the aircraft's operation. As air traffic grows, aviation's CO₂ contribution will increase unless there are offsetting improvements in aircraft/engine technology, renewable fuels, operational procedures, and traffic management.

The NAS energy efficiency target was selected based upon knowledge of the factors that most accurately characterize commercial aircraft fleet fuel efficiency. The data that underlies this target can be assessed in terms of aircraft and engine technology, fleet turnover, and air traffic management procedures that influence routes and schedule.

FAA's Continuous Lower Energy, Emissions and Noise (CLEEN) program goals related to the energy efficiency performance plan are to develop and demonstrate (1) certifiable aircraft technology that reduces aircraft fuel burn by 33 percent relative to current subsonic aircraft technology, and which reduces energy consumption and GHG emissions; (2) use of "drop in" sustainable alternative jet fuels in aircraft systems and quantifying benefits; and (3) suitability of new technology for engine and aircraft retrofit to accelerate penetration into the commercial fleet. Recognizing significant progress toward these goals under the CLEEN program, in 2015 the FAA initiated CLEEN II, a follow-on program that will run from 2015 through 2020, pursuing a goal of 40 percent reduced fuel burn compared to a best in class year 2000 in service baseline.

FAA uses radar-based data from the Enhanced Traffic Management System, or ETMS, to generate annual inventories of fuel burn and Official Airline Guide, or OAG, schedule information to estimate total distance flown data for all U.S. commercial operations. The Bureau of Transportation Statistics, or BTS, provides the payload factors for commercial aircraft. This information is used to estimate progress of the energy efficiency performance indicator against the performance targets.

PERFORMANCE REPORT

Aviation Energy Efficiency (FAA)								
Goal Description	2010	2011	2012	2013	2014	2015 Target	2015 Actual	Performance
Percent reduction in aviation fuel burned per revenue-ton-mile from the FY 2001 energy use baseline	19.08%	22.28%	22.72%	21.66%	22.4%	20%	24.41%	Met 

Progress Update-Results

FAA’s current energy efficiency target is based on a 2-percent per-year improvement, relative to a calendar year (CY) 2000 baseline (i.e., CY 2000 = 0 percent). For FY 2015, the target in terms of fuel consumed by payload (the load carried by an aircraft that is not necessary for its operation, e.g., passengers or cargo) transported and distance flown decreased 20 percent relative to the baseline. With a result of a 24.41-percent decrease, FAA was successful in achieving its energy efficiency goal.

In addition, the FAA’s CLEEN program is accelerating the development of energy efficient technologies. These will be deployed to the commercial fleet sooner than normal market forces would have enabled. General Electric’s advanced engine combustor known as the Twin Annular Premixed Swirler (TAPS) II, which was matured under the CLEEN program, will be used in CFM International’s LEAP turbofan engine and is expected to enter service in 2016.

Advances in the development of sustainable alternative fuels also offer great promise for emissions reduction. Nearly 100 percent of the fuel used in aviation operations is petroleum-based, raising issues of energy supply, energy security, and the effect of fossil fuel emissions on air quality and climate. In response to these multiple concerns, government and the aviation industry have a strong interest in alternative aviation fuels that can be blended with or replace petroleum jet fuel without changes to existing engines, aircraft, ground infrastructure, or supply equipment.

More information about the CLEEN program can be found at: <http://faa.gov/go/cleen>

PERFORMANCE PLAN

Reducing Carbon Dioxide Emissions (FAA)				
Goal	Indicator	FY 2016 Target	FY 2017 Target	
Maintain or reduce carbon dioxide (CO2) emissions out to 2020 for domestic operations NAS-wide, relative to the CY 2005 baseline. [New]	CO2 emissions from domestic operations	<132.7 terra grams (Tg)	<132.7 terra grams (Tg)	

Key Strategies

The strategic target is to maintain carbon dioxide (CO2) emissions for domestic operations at or below the CY2005 levels out to 2020. This performance target indicates that aircraft flying in the

NAS burn less fuel (synonymous with less CO2 emissions) year-on-year due to improvements in fleet fuel efficiency, despite growth in domestic aviation. Demonstrating continued progress in maintaining carbon dioxide emissions for domestic commercial aircraft operations within the airspace system at or below 2005 levels minimizes environmental and climate impacts.

Paramount to reducing CO2 emissions and improving fuel efficiency will be a continued focus by commercial airlines to modernize their fleets. FAA will also focus on deploying NextGen and continuing research and development of advanced engine, airframe and fuels technologies. Transitioning to more fuel efficient aircraft models, implementing NextGen improvements, and developing and maturing technologies under FAA's CLEEN technology program and the National Aeronautics and Space Administration (NASA) supported research programs will contribute greatly toward continued improvements.

Fuel burn (synonymous with CO2 emissions) and fuel efficiency are heavily dependent on commercial airline operating procedures and day-to-day operational conditions. This includes the airline's operating fleet and route assignments, air traffic conditions, weather, airport operating status, congestion in the system, and any disruptions that introduce delay in scheduled flights. For example, a major sustained disruption or enhancement in air traffic and/or a significant shift in commercial operations amongst airlines, including changes in fleet composition and missions could have a profound impact upon achieving the performance target.

FAA's worldwide partners include the International Civil Aviation Organization, or ICAO, which is focused on developing environmental standards and recommended practices, as well as other Federal agencies (i.e. EPA, NASA, and the Department of Defense), the Aerospace Industries Association, Airports Council International-North America, Airlines for America, the Airport Cooperative Research Program (ACRP), and the Aviation Sustainability Center (ASCENT, the FAA Center of Excellence for Alternative Jet Fuels and Environment). NASA works with FAA to conduct research and development in order to identify engine and airframe technologies that offer potential for reducing fuel burn and emissions. The Aerospace Industries Association works with FAA and NASA to commercialize technologies from the research phase and develop operational procedures to address environmental impacts. Airlines for America works with FAA to identify fleet and air traffic procedural changes that reduce fuel burn and improve fuel efficiency.

CLEEN has a partnership with industry. Industry funds at least 50 percent of development and testing costs leading to ground and/or flight test technology demonstrations. Industry will entirely fund product development costs required for certification and entry into service in the fleet. Since 2006, FAA has also been a major partner in the Commercial Aviation Alternative Fuels Initiative® (CAAFI, <http://www.caafi.org>), whose participants include a cross-section of airlines, manufacturers, airports, fuel producers, Federal agencies and international players. CAAFI's efforts are leading to new fuel standards and early production of sustainable alternative jet fuels.

Next Steps

FAA has several ongoing primary activities supporting the reduction of foreign oil-dependence and carbon emissions and the increase in energy efficiency and usage of alternative fuels. These activities are:

- Develop and deploy sustainable alternative jet fuels by leveraging CLEEN, CAAFI, and ASCENT.
- Develop and mature clean and quiet technologies and advance alternative fuels to mitigate NextGen environmental impacts through CLEEN.
- Leverage a broad cross section of stakeholders through ASCENT and ACRP to foster scientific, operations, policy and work advances and breakthroughs that mitigate emissions impacts.
- Continue to measure and track fuel burn and efficiency from aircraft operations annually, in order to monitor improvements in aircraft/engine technology and operational procedures, and enhancements in the airspace transportation system. This information provides an assessment of their influence on reducing aviation’s fuel burn and emissions contribution.

Goal Leaders

Michael P. Huerta, Administrator, Federal Aviation Administration
 Rich Swayze, Assistant Administrator for Policy, International Affairs and Environment, Federal Aviation Administration


Alternative-Fuel and Hybrid Transit Vehicles (FTA)

Overview

FTA promotes and researches the use of environmentally friendly equipment in transit infrastructure construction and operations. To track progress, the National Transit Database includes a revenue vehicle inventory that records the primary fuel type of each vehicle used for carrying passengers in public transportation. The revenue vehicle inventory includes all modes of public transportation, rail and nonrail. This measure is a count of all such vehicles that are recorded as not being powered directly by traditional fossil fuels, divided by the total number of revenue service vehicles.

PERFORMANCE REPORT

Aviation Energy Efficiency (FAA)

Goal Description	2010	2011	2012	2013	2014	2015 Target	2015 Actual	Performance
Percentage of alternative-fuel and hybrid vehicles in the total revenue fixed route fleet.	44%	45%	47%	50%	50%	49%	N/A	Met 2014 

Progress Update – Results

As part of the Department’s Environmental Sustainability goals, FTA aims to be a good steward for the natural environment by supporting the deployment of transit vehicles that make use of alternative fuels to emit fewer emissions. These efforts improve local air quality in America’s communities, and also support the transit industry’s larger efforts to mitigate emissions-induced climate change. FTA met its goal of 50 percent of the transit revenue fleet being comprised of

alternative-fuel and hybrid vehicles in 2013 and continued to exceed this goal in 2014. The calculation of this metric is based on data received through the National Transit Database. The performance for 2015 will be available in fall of 2016.

Alternative fuel vehicles are eligible under FTA’s core programs, including the Urbanized Area Formula Program and the Bus and Bus Facilities Program. FTA grants obligated during FY 2014 included funding for 1,597 Rail vehicles and 4,764 buses. Of the 4,764 buses that were in grants, 1,773 were alternative fuels.

In addition to formula fund support for alternative fuel vehicles, FTA’s Low or No Emission Vehicle Deployment (LoNo) Program provides funds for deployment of innovative bus technologies for U.S. transit operators. The program focuses on deploying the cleanest and most energy-efficient transit buses that are specifically designed to reduce emissions like carbon dioxide and carbon monoxide. Grants from the LoNo Program will help transit agencies integrate more of these cutting-edge buses into their fleets.

PERFORMANCE PLAN

Alternative Fuel and Hybrid Transit Vehicles				
Goal	Indicator	FY 2016 Target	FY 2017 Target	
Increase the percentage of alternative-fuel and hybrid vehicles in the total transit revenue service fleet to 44% in 2010 to 50% in 2016	Percentage of alternative-fuel and hybrid vehicles in transit revenue service fleets.	49%	50%	

Key Strategies and Next Steps

FTA does not directly purchase vehicles used for operating public transportation service. Vehicle purchase decisions, including the decision on fuel type, are made at the local level by transit agencies using FTA formula funds and limited discretionary funds. Meanwhile, the ongoing decline in prices for natural gas continues to make compressed natural gas an attractive alternative for many transit systems.

FTA also has authority to support research activities related to low- or no-emission bus and bus facilities to minimize environmental impacts and improve air quality. FTA can fund research that supports the goal of increasing the percentage of alternative-fuel and hybrid vehicles in the transit revenue service fleet.

Responsible Official

Vince Valdes, Associate Administrator for Research, Technology, and Innovation, Federal Transit Administration

Energy Use and Emissions Reduction (FHWA)

Overview

The Congestion Mitigation and Air Quality Improvement (CMAQ) program provides a funding source for State and local governments to fund transportation projects and programs that help meet the requirements of the Clean Air Act and help reduce regional congestion on transportation networks. CMAQ investments support transportation projects that reduce mobile source emissions in areas designated by the EPA as nonattainment or maintenance for the ozone, carbon monoxide and particulate matter National Ambient Air Quality Standards (NAAQS). Since its inception, \$30 billion in CMAQ funds have been invested in more than 30,000 projects that reduced emissions of particulate matter, carbon monoxide, nitrogen oxides, and/or volatile organic compounds and contributed to improved air quality and public health.

FHWA has developed tools to support States' efforts to reduce energy consumption and GHG emissions. FHWA continues to promote the use of EERPAT, a model that can be used by States to evaluate strategy alternatives and scenarios for reducing transportation-related GHG emissions and fuel consumption. It has also supported the development of other analytic tools, including practitioner handbooks and a spreadsheet calculator addressing emissions associated with transportation infrastructure.

PERFORMANCE REPORT

Progress Update

The [Energy and Emissions Reduction Policy Analysis Tool \(EERPAT\)](#) allows transportation agencies to evaluate the impact of transportation strategies on travel demand, energy consumption, and GHG emissions. Several States have used the analytic model to evaluate the combined effects of planning-related policies, highway operations, vehicle efficiency, and lower-carbon energy.

FHWA developed the Infrastructure Carbon Estimator, a calculator to estimate energy use and GHG emissions from the construction and maintenance of transportation infrastructure. The calculator allows practitioners to analyze infrastructure emissions associated with transportation plan alternatives, National Environmental Policy Act (NEPA) project alternatives, and alternative construction and maintenance practices. A final version was released in 2014, after being piloted by several States and Metropolitan Planning Organizations.

In January 2015, FHWA completed a report entitled [Feasibility and Implications of Electric Vehicle \(EV\) Deployment and Infrastructure Development](#) to better understand how the deployment of EVs will impact the mission of FHWA, the financial implications for available revenues, and potential infrastructure development needs for EV deployment in the United States.

Information Gaps

FHWA examined 72 projects selected from the more than 8,100 projects funded through the Congestion Mitigation and Air Quality Improvement (CMAQ) program between FY 2006 and FY 2012. A 20 member expert team that reviewed the information found that the projects were

consistent with the goals of the CMAQ program. Estimated emissions impacts were reported most frequently for these projects, and more so for changes in volatile organic compound and nitrogen oxide emissions than for carbon monoxide and particulate matter emissions. Estimates of traffic or congestion mitigation impacts were also frequently reported; however, these impacts are not anticipated in all funded projects and reporting is not required for project eligibility.

Estimation of human health impacts was underreported in these projects, again primarily because reporting is not required but also because there is no standardized methodology available to account for these health impacts. After examining 10 analytic models currently available for use to evaluate expected air quality outcomes for most CMAQ-funded actions, the team recommended improving model inputs, more consistency in reporting, new approaches for estimating impacts; and greater use of before-and-after studies to improve emission estimate methods. Based on a literature review, they also observed that projects that result in air quality improvements generally relate to reducing respiratory illnesses even though there is only limited causal evidence for this relationship. In addition, the team observed that projects which improve the physical and mental health of individuals can positively impact general well-being and quality of life; and projects that result in more equitable access to transportation produce multiple benefits including improved access to health care, education, jobs, nutritional food, and safe recreational areas.

Key Strategies

The CMAQ program provides broad flexibility in project selection for States and communities that need to reduce emissions from their transportation sources. The program's statutory focus on congestion- and emissions-reducing efforts is unique in the Federal-Aid Highway Program as it seeks to employ tailored transportation investments to combat formidable air quality challenges around the country.

Next Steps

The CMAQ program will support eligible transportation projects that help to reduce emissions in EPA designated nonattainment or maintenance areas. The FAST Act emphasizes the importance of reducing fine particulate matter emissions, setting aside a portion of CMAQ funds for this purpose.

The Oregon Department of Transportation pooled fund initiative was established in 2014 in coordination with FHWA and the U.S. Department of Energy. This initiative assists state and local transportation agencies interested with the needed tools, information, and knowledge to promote the use of alternative vehicle and fuel technologies at a state, regional or corridor scale. The initiative is now underway and will help States and regions reduce greenhouse gas emissions and petroleum use.

The FAST Act requires the Department to designate national corridors for electric and other alternative fuels. The legislation requires the designations and a report to be issued no later than one year from the date of enactment.

Goal Leader

Gloria Shepherd, Associate Administrator, Office of Planning, Environment, and Realty, Federal Highway Administration

Sustainable Practices at DOT (OST)

Overview




Under EO 13693, DOT is required to increase efficiency; measure, report and reduce GHG emissions in its own facilities and operations. OSSM will continue to strengthen the Department's culture of sustainability by developing long-term strategic plans, guidance documents for implementation, sharing best practices, tracking performance and providing training and outreach activities that promote sustainability goals such as improving energy efficiency, reducing vehicle fleet GHG emissions per mile, using more renewable energy and using technology alternatives in place of travel to reduce the GHG footprint of DOT's operations.



The Department is committed to achieving the above sustainability goals; however the following factors may impact the effectiveness of these efforts:

- Increase or change of core mission responsibilities.
- Alteration of existing and future appropriation of funds.
- New or revised sustainability requirements.
- Other unforeseen circumstances outside the control of the Department.

To mitigate some of these factors, the Department is maximizing the use of no- or low-cost tools such as performance-based contracts for energy efficiency enhancements or upgrades to existing buildings. Additionally, DOT is leveraging free, web-based data collection and management systems to monitor and measure sustainability performance such as EPA's ENERGY STAR Portfolio Manager System. Finally, the Department is partnering with other Federal agencies to achieve a common goal. For example, DOT continues to collaborate with experts in DOE's Workplace Charging Challenge to provide technical assistance with the identification of electric vehicle charging pilot sites to reduce GHG emissions.

PERFORMANCE REPORT

Sustainable Practices at DOT (OST)								
Goal Description	2010	2011	2012	2013	2014	2015 Target	2015 Actual	Performance
Percent reduction in greenhouse gas emissions from facilities and fleets	7.9%	15.4%	29%	29.4%	23%	8%	N/A†	N/A† 
Percent reduction in greenhouse gas emissions from employee business travel and commuting	N/A	(4.7%)	0.1%	27.3%	31%	6%	N/A†	N/A† 
Percent reduction of vehicle fleet petroleum use	5%	4.9%	14.5%	22.1%	23.7%	20%	26%	Met 

Goal Description	2010	2011	2012	2013	2014	2015 Target	2015 Actual	Performance
Percent reduction in building energy intensity consumption	20.2%	26.4%	24%	19.6%	19%	30%	N/A†	N/A† 
Percent use of renewable energy	3.6%	8.4%	14.4%	9.2%	19.1%	10%	N/A†	N/A† 

† Available in spring 2016

Progress Update

OST's Office of Sustainability and Safety Management (OSSM) completed the following accomplishments in FY 2015:

- Used the *Greenhouse Gas and Sustainability Data Report* template developed by the Department of Energy (DOE), submitted DOT's GHG inventory to DOE for review and comment. In addition, the Office completed a department wide survey of its employees' commuting habits to measure GHG emissions.
- Updated the Department's Strategic Sustainability Performance Plan as per Executive Order (EO) 13514.
- Submitted updates and additional supportive data for bi-annual Office of Management and Budget (OMB) Sustainability and Energy Scorecard.
- Provided ongoing technical support and guidance to each of the 10 OAs regarding activities such as Energy Efficiency and Renewable Energy Consumption, High Performance and Sustainable Buildings (HPSB), Performance-based Contracts, and Fleet Management to ensure the Department continues to meet the latest regulatory and legislative requirements along with organizational goals. Additionally, the office continues to update a guidance manual(s) for departmental field offices for implementing the above referenced policies.

PERFORMANCE PLAN

Sustainable Practices at DOT (OST)				
Goal	Indicator	FY 2016 Target	FY 2017 Target	
Reduce DOT building energy intensity use 25% from an FY 2015 baseline by FY 2025.	Percent reduction from the FY 2015 energy use baseline.	2.5%	5%	
Reduce DOT vehicle fleet GHG emissions per mile 30% from an FY 2014 baseline by FY 2025.	Percent reduction from the FY 2014 fleet petroleum use baseline.	3%	6%	
Obtain 30% of total energy from renewable sources by 2025	Percent of energy consumed from renewable resources.	10%	10%	
Reduce greenhouse gas emissions by 35% from facilities and fleets by 2025 from a FY 2008 baseline.	Percent of greenhouse gas emissions reduced from the FY 2008 baseline.	14%	16%	
Reduce greenhouse gas emissions by 35%	Percent of greenhouse gas	14%	16%	

Goal	Indicator	FY 2016 Target	FY 2017 Target
from employee business travel and commuting by 2025 from an FY 2008 baseline	emissions reduced from employee business travel and commuting from an FY 2008 baseline.		

Key Strategies and Next Steps

Leadership in Sustainability Scorecard: The Department will continue to evaluate each OA’s sustainability performance during the internal management review meetings with the Deputy Secretary. The scorecards have been updated to reflect current priority areas such as energy efficiency.

Policy Orders, Action Memos, and Guidance Documents: The Department plans to update sustainability policy orders and will continue working on supporting guidance documents that help to reduce its environmental footprint and resource consumption and ensure that its buildings and fleet are performing efficiently with the best return on investment for the American people. The Department is also updating its comprehensive fleet management policy this year.

Greenhouse Gas Inventory: The Department will continue to compile a comprehensive inventory of GHG emissions and identify opportunities and strategies for reducing these emissions.

Performance-Based Contracts: The Department will continue, to the maximum extent possible, to use these no- or low-cost contracts for energy efficiency enhancements or upgrades to existing buildings.

Annual Reports to OMB: The Department will continue to track and update its strategies and departmental performance to meet requirements related to reports such as the Strategic Sustainability Performance Plan and the OMB Scorecard.

Sustainability Action Plans: The Department is working on developing and implementing new strategies related to benchmarking, metering, renewable energy and energy efficiency resulting in a pro-active approach to monitoring and improving the energy and water footprint. Additionally, the Department is working on developing and implementing new strategies related to climate change resiliency, workplace electric vehicle charging and multi-modal commuting options for its employees to reduce GHG emissions.

Other key partners are FAA Real Estate Management System, or REMS, managers; EPA; the Office of the Federal Environmental Executive, or OFEE; the Council on Environmental Quality (CEQ), OMB, and the General Services Administration (GSA). As a key member of interagency workgroups, DOT has worked closely with GSA and DOE to provide comments and recommendations on government-wide issues related to HPSBs, the GHG emissions inventory, climate change resiliency and energy use in federal buildings. Conversely, DOE, CEQ, and OMB serve as oversight agencies, which issue guidance and review DOT’s annual sustainability and energy-related reports.

Goal Leader

Jeff Marootian, Assistant Secretary for Administration & Chief Sustainability Officer, Office of the Secretary