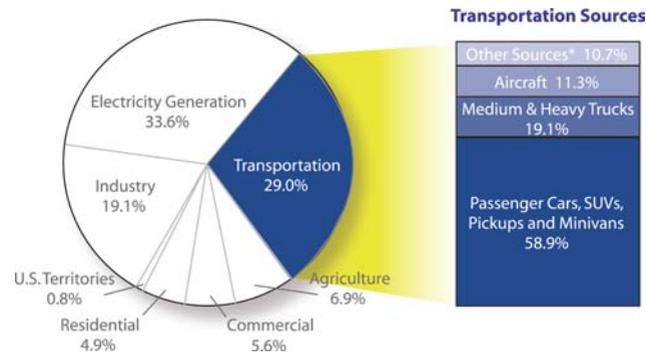


ROLE OF TRANSPORTATION IN CLIMATE CHANGE

Emissions Source

The transportation sector accounts for approximately 29% of human-caused GHG emissions in the U.S. On a global scale, U.S. transportation sources represent about 32% of total transportation GHGs and about 5% of GHGs from all sectors. These estimates do not include emissions from the production of fuel and vehicles and the construction and maintenance of infrastructure, which would increase the U.S. transportation sector's share to almost 8% of global GHGs.

U.S. Greenhouse Gas Emissions in 2007



*Other sources include waterborne (5.2%), rail (2.7%), pipelines (1.6%), buses (0.6%), lubricants (0.5%) and motorcycles (0.1%).

Aircraft and waterborne estimates include fuel purchased in the U.S. for international transport, also known as international bunker fuels.

Sources: From an FHWA analysis of the Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2007 (U.S. Environmental Protection Agency 2009) and World Resources Institute's CAIT 6.0 model. Note that estimates for gasoline-powered vehicles include ethanol emissions, which are not included in EPA's transportation totals.

Impacts on Infrastructure

Climate change could impact transportation systems in a variety of ways, and differently in each region.

- Sea-level rise could inundate and damage coastal infrastructure in low-lying areas or make it more vulnerable to storm surges.
- Increases in storm intensity would have serious impacts on transportation operations and infrastructure.

These impacts may require changes in transportation facility location, design, construction, and operations.



U.S. Department of Transportation
Federal Highway Administration

Office of Planning, Environment,
and Realty

HIGHWAYS AND CLIMATE CHANGE



For more information, please visit:
www.fhwa.dot.gov/hep/climate

It all adds up to cleaner air

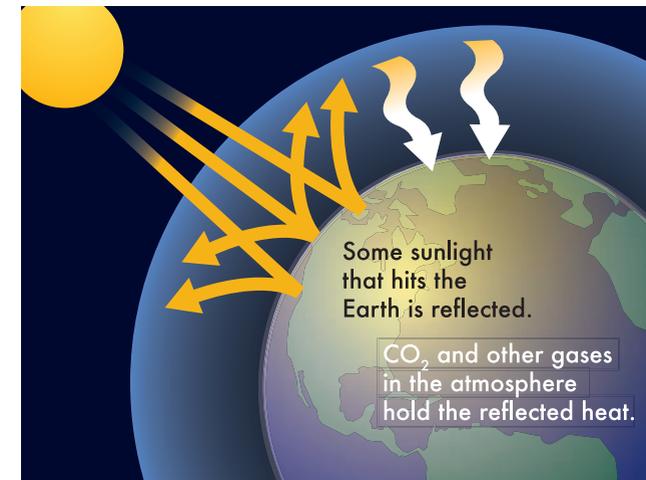
FHWA-HEP-09-018
May 2009

WHAT IS THE GREENHOUSE EFFECT?

Greenhouse gases (GHGs) trap the sun's energy in the Earth's atmosphere by absorbing and reflecting some of it to Earth rather than allowing the energy to escape back to space. This is called the "greenhouse effect." Without the greenhouse effect, the Earth would be too cold to support life.

Natural cycles of warming and cooling have occurred throughout the Earth's history. However, increased levels of GHGs in the atmosphere from human activities have intensified the greenhouse effect beyond what can be attributed to these natural cycles, leading to increases in average global temperature. Combustion of fossil fuels is a significant source of GHGs, including carbon dioxide, methane, nitrous oxide, and ozone.

Changes in temperature and weather patterns resulting from systems such as the greenhouse effect are known as climate change. While difficult to predict with certainty, the consequences of climate change can be very serious.



STRATEGIES TO REDUCE EMISSIONS

There are four primary ways to reduce GHG emissions from transportation.

Improve system and operational efficiencies:

Traffic flow improvements can be achieved through intelligent transportation systems, route optimization, congestion pricing, and enhanced intermodal links and system connectivity. Operational efficiencies can be achieved through improving vehicle maintenance and reducing idling of freight vehicles – for example, by installing auxiliary power units and truck-stop electrification systems to save fuel and reduce emissions.

Reduce growth of vehicle miles traveled (VMT):

Implementing land-use strategies that help to concentrate development can lessen the need to drive. The number of vehicle trips can also be reduced by providing high-occupancy-vehicle lanes, transit options, and pedestrian and bicycle facilities and by promoting travel demand management programs and telecommuting. Pricing mechanisms such as road pricing and mileage-based car insurance can also motivate people to drive less.

Transition to lower-GHG fuels: Gasoline and diesel can be replaced with fuel such as biodiesel and natural gas, which can emit fewer GHGs over their lifecycle from production to final use.

Improve vehicle technologies:

The development of more fuel-efficient vehicles can be promoted through policy decisions, tax credit programs, and feebates.



FHWA CLIMATE CHANGE ACTIVITIES

FHWA is actively involved in efforts to support and disseminate climate-change-related research and to provide technical assistance to stakeholders. For additional information on all of these activities, visit the Highways and Climate Change website at www.fhwa.dot.gov/hep/climate.

Technical Assistance

FHWA provides State Departments of Transportation (DOTs) and metropolitan planning organizations (MPOs) with technical assistance on how to conduct GHG emissions analyses and address climate change impacts on transportation decision-making.

In addition, the FHWA Resource Center Air Quality Technical Services Team can provide assistance with the use of existing and new models and tools to analyze GHG emissions. See www.fhwa.dot.gov/resourcecenter/teams/airquality.

Outreach/Education

FHWA gathers information on effective practices, develops reports and case studies, and shares information at conferences and through websites. It supports the USDOT Transportation and Climate Change Clearinghouse, which provides transportation professionals at all levels of government with a “one-stop” source of information on transportation and climate change issues. Visit the Clearinghouse website at www.climate.dot.gov.



Transportation and Climate Change
CLEARINGHOUSE

Research

FHWA supports research to reduce highway-related emissions and assess the impacts of climate change on transportation systems.

Examples of recent research include the Carbon Sequestration Pilot Project and coastal impact studies in the Gulf Coast and Mid-Atlantic regions.



Interagency Coordination

FHWA leads an Interagency Working Group on Transportation, Land Use, and Climate Change to identify and explore opportunities to leverage existing Federal programs and policies with the goal of reducing growth in VMT and resulting GHG emissions. The group comprises 10 Federal agencies.

FHWA supports the USDOT Center for Climate Change and Environmental Forecasting, a multimodal effort to research and evaluate transportation strategies to reduce GHGs and to prepare for the potential effects of climate change on transportation infrastructure.

CLIMATE CHANGE AND TRANSPORTATION PLANNING

Climate change considerations should be integrated throughout the transportation decision-making process, from planning through project development and delivery. Addressing climate change mitigation and adaptation upfront in the planning process will facilitate decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project-level decision-making.

Climate change considerations can easily be integrated into many planning factors to support economic vitality and global efficiency, increase safety and mobility, enhance the environment, promote energy conservation, and improve the quality of life.

Examples of State and local activities appear below.

New York State

New York State’s Energy Plan, adopted in 2002, was one of the first in the Nation to integrate transportation planning, energy conservation, GHG mitigation, and air quality planning. It requires MPOs in the State to report energy and GHG emissions resulting from Transportation Plans and Improvement Programs.

Puget Sound Regional Council

The Puget Sound Regional Council *VISION 2040* Plan commits the region to “reduc[ing] the rate of energy consumption use per capita, both in building use and in transportation, even as the region grows” and includes a goal to “reduce its overall production of harmful elements that contribute to climate change.”

Adaptation in Long-Range Planning

The Connecticut Transportation Plan, Oregon Transportation Plan, and Houston-Galveston Area Council 2035 Plan feature discussions on climate change adaptation, including safety, operations, and maintenance related to potential sea-level rise, land subsidence, hurricanes, and storm activity.