

Successes **in** Stewardship

<http://www.environment.fhwa.dot.gov/strmlng/es4newsltrs.asp>

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Carbon Sequestration Along Highway Rights of Way: Piloting a Concept

State transportation agencies often find themselves balancing environmental concerns against the financial feasibility of actions to alleviate those concerns. As one major environmental concern — climate change — is increasingly understood, governors, state legislatures, and the federal government are exploring ways to reduce emissions of greenhouse gases, particularly carbon dioxide (CO₂). Because vegetation naturally removes (“sequesters”) CO₂ from the air, state transportation agencies have an opportunity to reduce their total emissions and even earn revenue by changing vegetation-management practices in their state department of transportation (DOT)-owned rights-of-way (ROW).

To explore this potential, the Federal Highway Administration’s (FHWA) Office of Natural and Human Environment is conducting a Carbon Sequestration Pilot Project (CSPP). The goals of the project are to quantify the amount of carbon that can be sequestered using native vegetation management on DOT lands and to estimate the revenue that could be generated through the sale of “carbon credits” on an emissions trading market.

Carbon Sequestration in Plants: the Basics

CO₂ is the greenhouse gas produced in the largest volume by human activities. Reducing CO₂ levels in the atmosphere is the goal of most efforts to slow global warming. There are two ways to reduce CO₂ concentrations in the air: (1) do not allow CO₂ to enter the atmosphere (i.e., control emissions), and (2) remove some of the excess CO₂ already in the atmosphere and “sequester” it where it does less harm.

Plants naturally perform this second action, capturing CO₂ for use in photosynthesis. Although individual plants die and decompose, grasslands and forests eventually reach steady states in which the amount of CO₂ released by dying plants is offset by new plants. Depending on the climate and vegetation type, forests annually sequester between 1.0 and 2.5 tons of CO₂ per acre, while grasslands sequester between 0.3 to 2.5 tons per acre. Young forests and grasslands can sequester substantially more than this on an annual basis, while “old growth” forests are closer to equilibrium.

With this in mind, FHWA selected the New Mexico Department of Transportation (NMDOT) to quantify and encourage the growth of existing trees, bushes, and native grasses growing in state-owned ROW that would sequester atmospheric CO₂.

Selling ROW Carbon: Cap and Trade

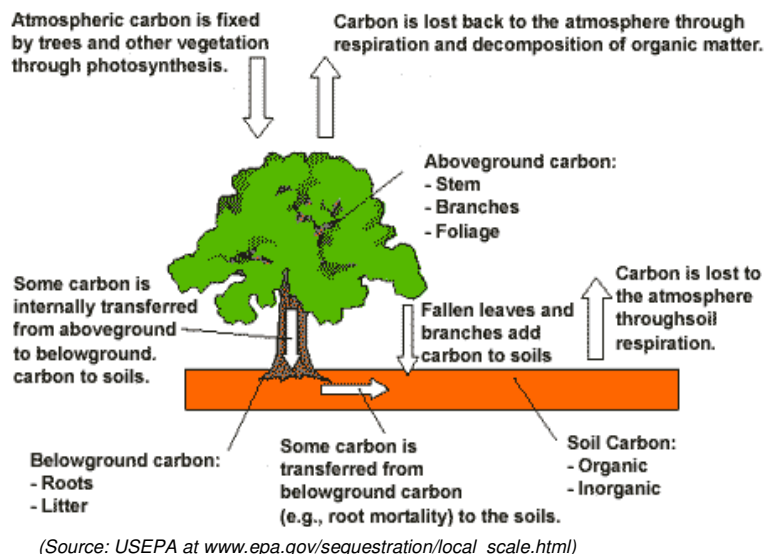
In addition to being good for the environment and human health, the appeal to state DOTs of sequestering carbon in highway ROWs is that it offers the opportunity to use existing resources to earn income. To earn revenue for the CO₂ sequestered in vegetation, an entity — in this case a transportation agency — must become a member of a trading group,

What types of carbon sequestration are there?

Vegetative sequestration is the natural intake of CO₂ by plants, which incorporate it in their wood, leaves, and roots and also bind it to the underlying soil. Much of this CO₂ is not released into the atmosphere until the plant is destroyed (by decay or burning) or the soil is tilled and exposed to the atmosphere.

Geologic sequestration starts with the mechanical capture of CO₂ from an emissions source (e.g., a power plant). The captured CO₂ is injected and sealed into deep rock units.

An Illustrated Guide to the Carbon Cycle



such as the Chicago Climate Exchange (CCX). CCX is a voluntary but legally binding market for buying and selling carbon credits. For more details on CCX, go to their website: www.chicagoclimateexchange.com.

The trading process is part of a “cap-and-trade” system, an economic incentive tool for reducing pollutants in the atmosphere. In the U.S., where cap-and-trade is already mandated by the Environmental Protection Agency for acid rain pollutants, a cap, or upper limit for the pollutant that can be emitted annually into the atmosphere, is established. The government then allocates portions of this total volume to the major emitters in the economy; i.e., each entity would be able to emit up to a certain annual allowance. The total of all allowances would equal the countrywide cap. Entities then either pay extra if they exceed their pollutant allowance or profit if they emit less than their allowance and sell the resulting credits. One potential advantage of cap-and-trade is that it does not mandate how the polluting entity meets its target, allowing the flexibility to reduce costs.

The CCX standard for carbon sequestered by forests is 1.0 metric ton per acre, and between 0.4 and 1.0 metric tons per acre for grassland. Market prices have recently varied between \$1 and \$30 per metric ton, meaning that 1,000 acres of forest could generate revenues between \$1,000 and \$30,000 annually.

NMDOT’s Participation in the CSPP

Through an iterative process that narrowed the field of potential participants to three candidate state DOTs, NMDOT was selected to participate in the FHWA CSPP based on its alignment with various criteria, including, among other factors:

- National Highway System rural road mileage
- Total state acres of potential forest and grassland if allowed to grow naturally
- Data on the amount of different vegetation types
- Presence of state policies or indicators that would encourage participation
- Self-expressed interest in potentially participating
- State membership in an emissions-trading platform.



An example of the kind of native vegetation growing in the ROW that NMDOT will be quantifying to determine the amount of CO₂ that can be sequestered.

The state of New Mexico is already a member of CCX, and NMDOT is moving to register its qualifying native vegetation acreage of grassland and forest. As next steps in the pilot, which is scheduled for completion at the end of 2008, FHWA plans to work with NMDOT to help quantify and verify the acres available for carbon sequestration and to estimate the vegetation costs and potential value of marketable credits. The pilot is expected to substantially assist NMDOT in meeting its emissions reduction goals, thus reducing fuel costs from mowing and generating revenue. This emissions reduction can be used as carbon credits if the state comes in under its cap, and may be just as beneficial as carbon sequestration. However, the vegetation associated with carbon sequestration is beneficial in other ways, potentially providing habitat for wildlife, preventing erosion, and reducing storm water runoff.

With agencies facing the challenge of doing more while spending less, NMDOT’s participation in the pilot project is expected to demonstrate the benefits of sequestering CO₂ in vegetation within the highway ROW and help inform future transportation and climate change legislation.

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Look What's New!

Read FHWA's new report on climate change and transportation – [*FHWA Issues Report on Integrating Climate Change into Transportation Planning*](#)

Read FHWA's new report on [Meeting Environmental Requirements of Bridge Collapse](#), which details effective practices in expediting post-bridge collapse environmental review from five case studies around the country.

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