Safe Routes to School

Steps to a Greener Future

How walking and bicycling to school reduces carbon emissions and air pollutants

SAFE ROUTES to School
NATIONAL PARTNERSHIP

Prepared for the Centers for Disease Control and Prevention (CDC) - December 2008

Introduction

Cumulatively, it is estimated that Americans will drive approximately 2.9 trillion miles in their cars and trucks in 2008.[1] For each mile driven, cars and trucks produce carbon dioxide from burning fuel and emit other harmful and heat-trapping pollutants—contributing significant amounts of greenhouse gases to the atmosphere and impacting air quality. In fact, the transportation sector produced nearly one-third (29 percent) of all U.S. greenhouse gas emissions in 2006 and greenhouse gas emissions from transportation are increasing more quickly than other sectors.[2] The transportation sector in the United States accounts for more carbon dioxide emissions than any other nation's entire economy, except for China.[3] These emissions of carbon dioxide and other pollutants are having a negative impact on our children, our communities, and our planet.

Scientists have demonstrated the link between increased levels of carbon dioxide and other greenhouse gases and the Earth's temperature. The "greenhouse effect" describes how the presence of heat-trapping gases such as carbon dioxide, methane and nitrogen oxide causes the temperature of the Earth's surface to rise. As levels of greenhouse gases in the atmosphere increase, the warming effect intensifies. Scientists have documented an increase in surface temperatures of approximately 1.4 degrees Fahrenheit between 1900 and 2005, with the last decade being the hottest in the past 150 years. While there could be many contributing factors for this temperature increase, scientists are increasingly identifying the rise in emissions of carbon dioxide and other greenhouse gases from activities like the burning of fossil fuels from automobiles and deforestation as the primary factors.[4] In 2007, the United Nations Intergovernmental Panel on Climate Change recommended decreasing global greenhouse gas emissions by 50 to 85 percent by 2050 to limit detrimental effects of climate change.[5] If left unchecked, rising temperatures are predicted to lead to changing weather patterns, rising sea levels, stronger hurricanes, and more.

There is also strong evidence linking air pollution produced by traffic—such as hydrocarbons and nitrous oxides, which combine to form ozone, and carbon monoxide—to public health problems like asthma, other chronic respiratory illnesses, and certain cancers.[6] For children, the risks are even greater. Studies have shown that children living within a third of a mile of a freeway not only were more likely to have asthma, but also had reductions in lung function, which is a risk factor for respiratory and cardiovascular disease later in life.[7] More recently, researchers highlighted the danger that children face in school—where they spend a significant amount of time—by determining that approximately one in three U.S. public schools are located in "air pollution danger zones," within a quarter-mile of highways.[8]

Clearly, reducing air pollutants and carbon emissions is in our best interest for creating a sustainable and healthy future, and will take wide-ranging solutions at all levels of our government and economy. No one solution will be able to solve a problem of this magnitude. However, one easy way for individuals to make a difference in reducing pollution and its effects on human and planetary health is to decrease the number of miles they drive, which will reduce emissions of carbon dioxide and other harmful pollutants.

One federal program that is successfully encouraging families to substitute walking and bicycling for driving short trips is the Safe Routes to School program. First created in August 2005 through the SAFETEA-LU federal transportation bill, and funded at $612 million over five years, Safe Routes to School focuses on making it safer and easier for more children to walk and bicycle to and from schools. Each state's Department of Transportation administers the program, and the bulk of the funding allows schools and communities to retrofit roads and build sidewalks, bike lanes, and pathways to improve safety for children walking or bicycling to school. A smaller portion of funding supports walking and bicycling safety education, driver awareness campaigns, traffic enforcement, and promotional events to encourage more children to walk and bicycle. Already, more than 4,000 elementary and middle schools around the country are undertaking Safe Routes to School efforts thanks to funding from this popular federal program.

While Safe Routes to School is a relatively new program, many communities are already demonstrating the increase in walking and bicycling and a related decrease in traffic congestion and vehicle miles that can come from a focused and planned effort. This report profiles five communities that have made strides in reducing carbon dioxide emissions and harmful pollutants around schools through the implementation of Safe Routes to School programs.

Safe Routes to School

[1] "Traffic Volume Trends." US Department of Transportation, Federal Highway Administration, Office of Highway Policy Information, July 2008. Available at http://www.fhwa.dot.gov/ohim/tvtw/08jultvt/index.cfm.

[2] "Greenhouse-Gas Emissions from the U.S. Transportation Sector: 1990-2003." United States Environmental Protection Agency, March 2006. Available at http://www.epa.gov/otaq/climate/basicinfo.htm.

[3] Greene, David L. and Schafer, Andreas. "Reducing Greenhouse Gas Emissions from U.S. Transportation." Pew Center on Global Climate Change, May 2003. Available at http://www.pewclimate.org/global-warming-in-depth/all_reports/reduce_ghg_from_transportation.

[4] "The Causes of Global Climate Change, Science Brief 1." Pew Center on Global Climate Change, updated August 2008. Available at http://www.pewclimate.org/docUploads/global-warming-science-brief-august08.pdf .

[5] "Climate Change 2007: Synthesis Report." Intergovernmental Panel on Climate Change. Available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

[6] McCubbin, D. and Delucchi, M. "Health Effects of Motor Vehicle Air Pollution," Institute of Transportation Studies, University of California-Davis, 1995.

[7] Gauderman, W. J., E. Avol, F. Lurmann, N. Kuenzli, F. Gilliland, J. Peters and R. McConnell, "Childhood Asthma and Exposure to Traffic and Nitrogen Dioxide," Epidemiology, Volume 16, No. 6, November 2005. AND
Gauderman, W.J., H. Vora, R. McConnell, K. Berhane, F. Gilliland, D. Thomas, F. Lurmann, E. Avol, N. Kunzli, M. Jerrett, and J. Peters, "Effect of exposure to traffic on lung development from 10 to 18 years of age: a cohort study," The Lancet, Volume 368, February 2007.

[8] Appatova, A. S., Ryan, P., LeMasters, G., Grinshpun, S. "Proximal exposure of public schools and students to major roadways: a nationwide US survey," Journal of Environmental Planning and Management, Volume 51, Issue 5, 2008.

[9] Based on estimate for 2008 enrollment in grades K-8, National Center for Education Statistics. http://nces.ed.gov/fastfacts/display.asp?id=65

[10] McDonald, N. "Active Transportation to School: Trends among U.S. Schoolchildren, 1969-2001," American Journal of Preventive Medicine, Volume 32, Number 6, June 2007.

[11] McDonald, N. "Active Transportation to School: Trends among U.S. Schoolchildren, 1969-2001," American Journal of Preventive Medicine, Volume 32, Number 6, June 2007.

[12] Davis, T., Hale, M. "Public Transportation's Contribution to Greenhouse Gas Reduction." American Public Transit Association, September 2007. Available at http://www.apta.com/research/info/online/climate_change.cfm.

[13] "Travel and environmental implications of school siting." US Environmental Protection Agency, EPA 231-R-03-004, October 2003. Available at http://www.epa.gov/smartgrowth/pdf/school_travel.pdf .

[14] Watson M, Dannenberg AL. "Investment in Safe Routes to School projects: public health benefits for the larger community." Preventing Chronic Disease, Volume 5, Issue 3, July 2008. Available at http://www.cdc.gov/pcd/issues/2008/jul/pdf/07_0087.pdf.

[15] Lawrence D. Frank, James F. Sallis, et al. "Many Pathways from Land Use to Health" Journal of the American Planning Association, Volume 72, Issue 1, Winter 2006.

Columbia, Missouri

Program Description

Columbia, Missouri is the fifth-largest city in Missouri, with a population of approximately 100,000 people. In a survey conducted in 2003, the PedNet Coalition, a local nonprofit, found that 80 percent of children living within a mile of their elementary school—who do not qualify for busing—were being driven to school, even though this is an easy distance to walk. To begin to increase the rate of walking and bicycling, in 2004, the PedNet Coalition began implementation of a Safe Routes to School program at a single school—Grant Elementary—using a patchwork of grant funding and volunteer staff.

The program has expanded over the years, due in large part to seven grants of federal Safe Routes to School funds, totaling $95,925, awarded by the Missouri Department of Transportation. Ten elementary schools with a combined enrollment of 4,500 children are now participating in the Safe Routes to School initiative, with four schools newly joining in the fall of 2008. The city of Columbia also participates in the federal Nonmotorized Transportation Pilot Program (section 1807 of SAFETEA-LU) and that program has also directed some funds to improve sidewalks and make other walking and bicycling safety improvements in the vicinity of participating schools.

The backbone of the PedNet approach in Columbia is the "walking school bus" in which parents and volunteers walk groups of children from neighborhoods to and from schools. Walking school bus routes average approximately a mile in length. To allow children living further away to participate, one elementary school has added a drop-off point in a nearby park. School buses and parents drop off children at the park, and the children then walk approximately a third of a mile to school under the supervision of volunteers.

The PedNet Coalition uses a variety of methods to ensure that parents are aware of the walking school bus program. Their website, www.pednet.org, includes a program overview, a brochure, and an online registration form. Before school starts, there is a walking school bus table at the "Meet the Teacher" night at each participating elementary. Parents can sign up on the spot and pinpoint their home on large-scale maps that then allow the school to plot the walking school bus routes for the year. The city health department has also provided some social marketing funding that has allowed them to do focus groups and surveys to create more effective posters and newspaper and radio ads.

Environmental Linkage

Columbia's Safe Routes to School efforts are motivated by a wide range of factors, including increasing physical activity, reducing gas consumption and pollution, and ensuring that children are ready to learn when they arrive at school. Parents have shown interest in environmental benefits from the Safe Routes to School program like air quality improvements and reducing traffic congestion around participating schools. However, children identified the environmental aspect of Safe Routes to School as a strong motivation for why they would consider walking or bicycling to school. In a survey of elementary students, the PedNet Coalition documented that children directly linked walking to school with helping the environment by cutting pollution and conserving fuel.

Documenting the Environmental Impact

At the ten elementary schools that have been participating since at least the 2007-08 school year, there are currently 350 registered participants for the walking school buses that operate daily. The PedNet Coalition estimates that 80 percent of those registered walk on a typical day. In addition, volunteers have noted that they see more children walking independently to school, and parents have commented that there is less traffic congestion outside of schools during drop-off and pick-up times, so participation is likely greater than the walking school bus numbers alone would indicate.

While the environmental impact of just one child choosing to walk or bicycle to school instead of being driven may not be significant, it does add up quickly. Given that 80 percent of

Columbia, Missouri

Columbia's students living within a mile of school were previously being driven, and that 80 percent of the 350 walking school bus registrants walk each day, an estimated 224 automobile miles per day are avoided by walking school bus participants just on the trip to school. That is a reduction of 40,320 miles each school year, producing 19 fewer tons of the greenhouse gas carbon dioxide and 1 less ton of other pollutants including carbon monoxide, hydrocarbons, and nitrous oxides. Approximately 20 to 30 percent of the students also walk or bicycle home from school, further increasing the environmental impact. *(Note:* All calculations for greenhouse gas and pollutant reductions were made utilizing the US Environmental Protection Agency's estimates of average annual emissions per vehicle mile, available at http://www.epa.gov/otaq/consumer/f00013.htm. Average trip lengths were based on interviews with school officials with each community profiled. The trip length, number of children participating, and number of school days in the year together equal the number of vehicle miles saved.)

Growing the Green Benefits

There's also great potential for growth of the Safe Routes to School and walking school bus program in Columbia. There are still 1,000 children living within a mile of the participating schools—representing another 640 vehicle miles per day just for the trip to school if children participate at similar levels as in the current program—that are not currently registered for the walking school bus. Participation has doubled in a year's time, and Columbia expects interest will continue to grow. Plus, as additional funds become available, the walking school bus program could expand to the 15 additional elementary and middle schools that are not currently participating.

Walking School Bus on the way in Columbia

Las Cruces, New Mexico

Program Description

Located in arid south-central New Mexico, Las Cruces is a mid-sized city of approximately 82,000 people that was an early adopter of the Safe Routes to School concept. The Las Cruces Metropolitan Planning Organization (MPO) began researching the concept and first convened a Safe Routes to School steering committee in September 2005, a year before the state of New Mexico began implementing the federal Safe Routes to School program. The steering committee was widely cast and included engineering and planning officials, school administrators and transportation directors, parents, and representatives from law enforcement. The steering committee ultimately decided that the best way to proceed was to start a pilot program at one area school. Principal Andrea Fletcher of Hillrise Elementary in Las Cruces volunteered her school as the test site.

As the MPO did not have a specific grant or budget to support the pilot program at Hillrise Elementary, the steering committee focused on improvements that could be made using city resources and on activities that could be carried out by volunteers. Beginning in April 2006, employees from the city's Public Works and Facilities Departments added crosswalks, repaired sidewalks, cleared branches overhanging sidewalks and obscuring signs, and restriped a major road to reduce vehicle speeds.

With important safety improvements in place, implementation of education, encouragement and enforcement activities began for the 2006-2007 school year. The police department posted a crossing guard at a major intersection and increased enforcement activities in the school zones. Children learned bicycle and pedestrian safety through safety CDs provided by the Federal Highway Administration and through a bike rodeo that had 100 percent participation. The school encouraged parents to allow their children to walk and bicycle through promotional means such as the school's monthly newsletter. And, the city's Information Technology Department used its GIS software to generate safe walking and bicycling route maps for the school.

Environmental Linkage

When the Las Cruces MPO and the steering committee began meeting, they considered a number of potential benefits from undertaking a Safe Routes to School program. One study that was an important factor was the October 2003 Environmental Protection Agency report on the environmental impact of school siting. The report documented that schools that were not

Scooters are fun in Las Cruces

designed to facilitate walking and bicycling had higher rates of traffic congestion, resulting in higher levels of air pollution and related negative impacts on children's health.

Documenting the Environmental Impact

As part of the pilot program, Hillrise Elementary conducted surveys at the beginning and end of the 2006-2007 school year. The survey documented a 7.3 percentage point reduction in trips to school made by the family car—from 85.4 percent to 78.1 percent, equivalent to 38 fewer cars arriving at school each morning to drop children off. Assuming an average trip length of three-quarters of a mile, that is a reduction of 5,130 miles driven on trips to school throughout the school year—which equates to a reduction of 2 tons of carbon dioxide and 283 pounds of other harmful pollutants like hydrocarbons, nitrous oxides, and carbon monoxide.

Growing the Green Benefits

Since Hillrise Elementary began its Safe Routes to School program before there was much information about best practices, and given the time it takes to change people's habits, it's understandable that the benefits in the first year were modest. There is documented room for growth—an estimated 60 percent

Las Cruces, New Mexico

of students live within a one-mile radius of the school. While additional surveys have not yet been conducted since the end of the 2006-2007 school year, the principal at Hillrise Elementary notes that the rate of children walking and bicycling to school has continued to increase, and traffic is likewise decreasing around the school.

Funding from the federal Safe Routes to School program, awarded by the New Mexico Department of Transportation, is allowing Las Cruces to expand upon the initial results at Hillrise Elementary. In March 2008, Hillrise Elementary received a grant of $27,460 to continue their Safe Routes to School program and install much-needed bicycle racks. Two other schools in Las Cruces—Camino Real Middle School and Mesilla Elementary—received 2008 planning grants of $15,000 each to develop Safe Routes to School action plans.

On a larger scale, the pilot at Hillrise has garnered support from the Las Cruces Public School Board, superintendent, and safety and transportation directors. The Las Cruces MPO now is preparing to undertake a school district-wide Safe Routes to School survey. Results from the survey will allow the school district to map the results, analyze transportation patterns on a school by school basis, and develop a district-wide Safe Routes to School action plan. The MPO is currently in negotiations with the New Mexico Department of Transportation to secure federal funding for a full-time Safe Routes to School coordinator for the entire MPO area, including the Las Cruces Public School District.

The magnitude of the environmental benefits experienced at Hillrise Elementary will be multiplied as the MPO seeks to expand Safe Routes to School to the 17,000 students at the 31 elementary and middle schools across Las Cruces. Assuming a similar change in the school drop-off patterns experienced at Hillrise, implementing Safe Routes to School at the Las Cruces K-8 schools would lead to a reduction of 167,535 vehicle miles, 77 tons of carbon dioxide, and five tons of other pollutants just in the first year of the program.

Las Cruces families walk to school

Longmont, Colorado

Program Description

Three elementary schools in Longmont, Colorado—Burlington, Eagle Crest, and Sanborn—are recent converts to Safe Routes to School. Located near Boulder, Longmont is demonstrating the power of innovative technology to inspire more children to walk and bicycle to school.

Through the Freiker (Frequent Biker) program, children who register their interest in walking and bicycling to school are equipped with radio-frequency ID tags to attach to their bike helmets or backpacks. Each morning before school, a walker or bicycler "rings in" by riding or walking underneath a "Freikometer," a solar-powered, wireless device that logs which children walked or bicycled to school that day. The logs are uploaded immediately to a website, www.freiker.org, allowing school officials to analyze in real-time how many children are walking or wheeling to school each day, and to calculate related information such as distance traveled, minutes of physical activity gained, and reductions of carbon dioxide emissions. Children who participate in the Freiker program can also earn prizes based on how frequently they walk and bicycle to school, building excitement and enthusiasm among students. The Freiker program is currently implemented in eight schools throughout Longmont and Boulder, using a portion of five grants totaling more than $270,000 awarded by the Colorado Department of Transportation with federal Safe Routes to School funds.

Freiker was first implemented at Crest View Elementary in Boulder, Colorado during the 2004-2005 school year and word of its success spread quickly to parents in neighboring towns and cities. The Safe Routes to School program in Longmont, Colorado began in April 2008 with a trial run at Burlington Elementary. Before the program began, only about a dozen children were bicycling to school regularly. During the month and a half before school let out for the summer, the Freiker program averaged 60 participants per day, a five-fold increase.

Based on the test run at Burlington Elementary, Eagle Crest and Sanborn were selected to join Burlington in implementing the Freiker program for the 2008-2009 school year. Sanborn Elementary, in particular, was very much in need due to high traffic volumes around the school at drop-off and pick-up times. In the afternoons, parents idled their cars near the school for up to 20 minutes waiting for their children, and then drove just a few blocks home. Parents actively complained about the traffic

Passing under 'Freikometer' in Longmont

congestion, but were not willing to let their children walk and bicycle because of the volume of traffic and fears about safety.

All three elementary schools kicked off the year with bicycle and pedestrian safety classes. They also hold weekly drawings for small prizes in which three or four children who walked or bicycled that day win a small prize. The drawings are held on random days so that children are encouraged to walk or bicycle every day, increasing the chance of earning a prize. Longmont has also set up drop-off points, called "Freiker stops," in neighborhoods around the school so that children with longer commutes can walk and bicycle in groups.

Environmental Linkage

For the Safe Routes to School organizers in Longmont, physical activity and health were the primary motivators for launching the program, as a response to increasing rates of childhood obesity and diabetes. However, as the program has expanded, the environmental aspect is becoming a larger motivating factor. Families are starting to think about their carbon footprints, and how to cut back on fuel costs. One family at the original Freiker site in Crest View Elementary has posted a chart in their garage to log each trip and method of transit taken, in an effort to get the whole family to reduce their reliance on the family car.

Longmont, Colorado

Documenting the Environmental Impact

While a Safe Routes to School program normally takes a year or two to grow participation levels, the three schools at Longmont have jumped right out of the gate due to strong promotion and word-of-mouth from Freiker participants in other towns. Plus the "cool factor" of the Freiker technology helps generate excitement among children about participating. At Eagle Crest Elementary, on average 199 of the school's 450 children are walking or bicycling each day, and there is a line of children on foot and bicycle waiting their turn to ring-in at the Freikometer. At Sanborn Elementary, over 40 percent of students at the school are now walking and bicycling every day, and the school's traffic problems have evaporated. And at Burlington, where children tend to live further from the school, an average of 56 children are walking or riding to school each day.

Since the beginning of the 2008-2009 school year, all three schools collectively are averaging a total of 414 children walking or bicycling both to and from school each day—one-third of the student population—generating 22,430 "people-powered" trips to school and home in just six weeks time. Over the course of the year, assuming a similar level of participation, this will save parents approximately 149,040 miles of driving. This equates to a savings of 68 tons of carbon dioxide and 4 tons of other pollutants including carbon monoxide, hydrocarbons, and nitrogen dioxide.

Growing the Green Benefits

The three schools at Longmont are the newest additions to the Freiker family. Five other schools in the Boulder area, as well as a school in Eugene, Oregon and another in Madison, Wisconsin, also utilize the Freiker program. At Crest View Elementary, where participation has doubled in three years time to 20 percent of all students, children logged over 10,000 bicycling trips to school during the 2006-07 and 2007-08 school year. Foothill Elementary in Boulder grew from approximately 32 rides to school per day in its first year of implementation to 45 rides per day in the second year—and the rate of growth continues to increase. Eldorado K-8 School in Superior, Colorado jumped from an average of 21 rides to school per day last year to 74 rides per day this year. And, all but a handful of these children also walk or bicycle home, doubling the benefits.

Freiker participant posing with newly won ipod in Colorado

Marin County, California

Program Description

Marin County, California, a suburb of San Francisco, is a national leader in the Safe Routes to School movement. In 2000, the Marin County Bicycle Coalition was selected as one of two national pilot programs by the National Highway Traffic Safety Administration to demonstrate the benefits of Safe Routes to School programs. The nine schools that participated in the initial pilot experienced a 57 percent increase in the number of children walking and bicycling and a 29 percent decrease in the number of children arriving alone in a car during the first year.

The success of the initial pilot in Marin County helped spur the creation of the federal Safe Routes to School program and helped secure passage of a county-wide half-cent sales tax to support transportation and Safe Routes to School efforts within Marin County. The Transportation Authority of Marin now manages the county's Safe Routes to School program, which reaches 90 percent of the county's public schools. All non-infrastructure activities are supported by the local sales tax and implemented through a sub-contract to the Marin County Bicycle Coalition. Infrastructure improvements have been funded by $2.3 million in federal Safe Routes to School grants, awarded by the California Department of Transportation, plus state funds and local funds from the sales tax.

Marin County's Safe Routes to School program uses a multi-pronged approach. Each school identifies a team leader who receives supplies, support, technical assistance and training throughout the school year to help them implement the program. Task forces, which encompass groups of participating schools organized by city or school district, engage key stakeholders to develop school travel plans and select the right promotional events and classroom materials for their school. Trained instructors provide traffic safety education and tie walking and bicycling to health and the environment.

Schools have access to traffic safety tools to help them partner with law enforcement to increase the police presence around schools and to educate drivers about driving safely near schools. Marin County has also developed a number of innovative promotional campaigns that have been replicated around the country, including a "Frequent Rider Miles" contest which rewards students who regularly walk or bike to school.

California family riding to school

Environmental Linkage

Most residents in Marin County are conscious of minimizing their impact on the environment. A major selling point for the Safe Routes to School program is that it can help reduce climate change and offset the fuel crisis. Several of the Safe Routes to School lesson plans and promotional programs have an environmental theme. For example, in one participating middle school, students developed a slide presentation detailing the environmental impact of driving and making the case for individuals to walk and bicycle more often.

Each spring, participating schools can implement a pollution punch card contest. Each time a child walks or bicycles to school, a "pollution gremlin" is "punched out" of their Safe Routes to School card, leaving behind a clean air scene, and showing how pollution was prevented. When the card is completed, the child receives a small prize and is entered into a drawing for a larger prize.

Documenting the Environmental Impact

As a well-established Safe Routes to School program, Marin County has many years of results to draw upon and has conducted evaluations of the program's performance and impact. Looking at data for an individual year is revealing. The 2004-05 evaluation, conducted by Nelson/Nygaard Consulting, looked specifically at the environmental aspect of the Safe Routes to School program. At that time, 37 schools participated with over 16,000 students enrolled. During the course of the school year, the percentage of children arriving and leaving school in a family car dropped from 55 percent to 42 percent—equaling 4,250 fewer car trips per day. The evaluators calculated that, based

Marin County, California

on the average length of the school commute and factoring in a round trip for the family car, that a total of 2.6 million vehicle miles were reduced over the course of the school year by the Safe Routes to School program. That is an annual reduction of 1,190 tons of carbon dioxide emissions and 72 tons of other pollutants, including carbon monoxide, nitrous oxides, and hydrocarbons.

Growing the Green Benefits

Promising trends on how to multiply the impact of reducing vehicle miles traveled at individual schools has emerged in the evaluations. It was found that schools using the new pollution-prevention punch card discussed above saw a nearly three-times greater reduction in single-student car trips over the course of the school year than schools that were not implementing that program.

The pollution punch-card idea is being rolled out on a national level through a partnership with Cool the Earth. The nonprofit organization works to encourage children to do their part to lessen their impact on the environment, including turning down the heat, switching to compact fluorescent light bulbs, and walking or bicycling to school. Cool the Earth is creating a pollution punch-card modeled after Marin County's Safe Routes to School program that includes a wide range of greenhouse-gas reducing actions children can take.

Windsor, Vermont

Program Description

Windsor is a small town in eastern Vermont, with a population of less than 4,000 people. As nearly 75 percent of students live within two miles of the local school, State Street School is an ideal candidate for a Safe Routes to School program. The Vermont Agency of Transportation awarded State Street School a two-year planning grant in 2006. The grant included the services of a planning consultant, support from the Southern Windsor County Regional Planning Commission, and up to $1,000 a year for small expenses like prizes and incentives for encouragement events.

The Commission and the consultant helped State Street School develop and administer surveys to identify parent concerns, assess traffic conditions, and analyze the walkability of areas surrounding the school. The parent survey allowed them to understand that the top parent concerns were focused on the speed of cars, unsafe sidewalks, and "stranger danger." As a result, starting with the 2006-07 school year, the school created walking school buses to ensure that children could walk or bicycle safely under adult supervision. Interested parents came to a meeting to discuss the concept, and gathered around maps to identify routes for the walking school buses. For children living further away, the school created a drop-off spot at the fairgrounds and other locations along the walking school bus routes. Parent volunteers escort all of the walking school buses on "Walking Wednesdays." The local police department also stepped up patrols around the school and posted "slow down, kids walking" signs to reduce vehicle speeds.

Now, at the beginning of each school year, parent information packets include details about the walking school bus routes and drop-off points. Children in fifth and sixth grade are often engaged as "junior patrols" to help younger children in the walking school bus stay together and safe. Children at the school are enthusiastic about the program, and can't wait for Wednesday to arrive each week.

Parent volunteers also were invited to join a Safe Routes to School planning group to pinpoint areas that needed traffic safety improvements for future grant applications. As a result, State Street School was awarded an infrastructure grant for $204,000 to build a sidewalk near the school, put a safety barrier between a sidewalk and the road in an especially high-traffic, high-speed area, and to install speed signs to remind drivers to slow down.

Students celebrate Walking Wednesdays in Windsor

Environmental Linkage

The Windsor program was started by the physical education teacher, who was interested in getting children to exercise more. Naturally, the health aspect is a strong component for how the program is advertised and implemented. However, in introducing the program to parents, Windsor Safe Routes to School advocates found that many parents were also interested in and motivated by the air quality improvements that could come from reducing traffic around the school. And children in the Windsor school system learn about the environment in their classes and are inspired to take action. Many parents have shared that their children are coming home at night and talking about how they can be more "green"—walking and bicycling to school is a natural fit.

Documenting the Environmental Impact

State Street School documented student travel modes before their grant began, and at the end of the first school year (2006-07). In just one school year, impressive shifts were documented. The percentage of children walking to and from school each day increased from only 14 percent to one-third of all students—nearly a 250 percent increase. Drop-offs from the family car decreased ten percentage points, representing an average of 23 fewer cars each morning. Assuming a one-mile travel distance each way for the trip to and from school, the school's efforts led to a reduction of 8,280 miles per school year, 4 tons of carbon dioxide, and 457 pounds of other pollutants. This does not include the impact of Walking Wednesdays, which has motivated

Windsor, Vermont

even more children to walk. It is reasonable to assume that car drop-offs were reduced even further during these weekly celebrations, but counts specific to Wednesdays are not available and thus are not included in the aforementioned calculation.

Growing the Green Benefits

While most of the adults in the town walked to school when they were young, safety concerns and perceptions had prompted most parents in Windsor to drive their children to school. Through a planned, multi-pronged effort, State Street School was able to make great progress on addressing parent concerns and reversing the driving trend. The Southern Windsor County Regional Planning Commission conducted traffic counts at four streets around the school that serve as primary entry points in October 2006, before the program began, and again in May 2008, at the end of the grant period. The traffic counts showed a decline of 2 percentage points in auto traffic around the school in the morning, and an 8.9 percentage point decrease in the afternoons. On Walking Wednesdays, traffic in some of the count locations dropped an additional 20 percentage points. In addition to the reduction in traffic, a decrease in vehicle speeds was also documented. In the four measurement locations around the school, vehicle speeds decreased an average of five miles per hour, down from 26 miles per hour to 21 miles per hour.

While the initial planning grant has ended, State Street School is continuing its walking school bus program. School officials also hope that the sidewalk and safety improvements that will soon be constructed will continue to build on their previous successes and encourage even more parents to allow their children to walk and bicycle to school.

Conclusion

It is clear that the Safe Routes to School program holds great promise for reducing carbon emissions and air pollutants. The five case studies documented in this report demonstrate initial promising successes, and show how one school's effort often spreads to additional nearby schools, furthering the environmental impact.

Calculations of reductions in carbon dioxide and pollutants in this report are intentionally conservative. Except in the case of Marin County, vehicle mile calculations only assume savings from a one-way car trip to or from school. If parents are driving children to school and then driving back home, the impact of eliminating a trip to or from school would be doubled. In addition, many parents picking up children sit in idling cars while waiting for school to let out, piping more emissions into the air. Given the lack of local data about idling times and frequency, this is not accounted for in any of the sites profiled. Finally, the emission savings are likely greater than noted as cars produce more emissions on short trips, while engines are still cold. As most trips to school are short cold-starts, this is likely to be the case, but is difficult to account for and so is not included in the calculations.

Nationally, there is a lot of room for growth in the number of children walking and bicycling to schools. Approximately 9.9 million children[9] (25 percent) currently live within one mile of their school, and only half of them currently walk or bicycle. Another 6.3 million children (16 percent) live within one to two miles of their school, and just 12 percent of them currently walk or bicycle to school. Half of children attending school in the U.S. are dropped off in the family car.[10]

If Safe Routes to School programs can change the habits of just 20 percent of the children living within two miles of school and get them to walk or bicycle to and from school instead of being driven, it would save an estimated 4.3 million miles of car travel per school day nationally. That's a total of 777 million vehicle miles during a school year—the equivalent of taking over 60,000 cars off the road entirely for a year, and keeping 356,000 tons of carbon dioxide and 21,500 tons of other pollutants out of the nation's air.

If our nation could return to the 1969 levels of walking and bicycling to school, in which 85 percent of children living within one mile and 50 percent of those living within one to two miles of schools walked or bicycled,[11] the environmental benefits would be

(con't on back page)

Conclusion con't

increased dramatically. In this scenario, an additional 5.9 million children would walk or bicycle to and from school—saving 10.6 million miles of car travel per school day, and a total of 1.9 billion vehicle miles during a school year. That would prevent 877,000 tons of carbon dioxide and 53,000 tons of other pollutants from entering our air and atmosphere. When you include the contributions of the 5.7 million children living within two miles of school who already walk or bicycle today, returning our country to the 1969 level of walking and bicycling to school would save 3.2 billion vehicle miles, 1.5 million tons of carbon dioxide, and 89,000 tons of other pollutants annually. As a point of comparison, this is equal to approximately twenty percent of the carbon dioxide savings generated by the entire American public transit system in 2005[12] or keeping more than 250,000 cars off the road for a year.

In addition to the greenhouse gas benefits, research already demonstrates that schools that are designed so that children can walk or bicycle have measurably better air quality. The U.S. Environmental Protection Agency documented that neighborhood schools reduce traffic, produce a 13 percent increase in walking and bicycling, and a 15 percent reduction in emissions of concern.[13]

Safe Routes to School is an easy to understand concept that families and children can engage in to reduce their carbon footprint and to positively impact air quality in their neighborhoods and around their schools. Plus, Safe Routes to School programs come with a wealth of related benefits—improvements in safety and traffic congestion, increased physical activity for children, improved alertness in school, reduced costs for school transportation budgets, and a greater sense of community engagement. Implementing Safe Routes to School programs could also lead to helping shape life-long habits and values for children, who begin to see the connection between their behavior, their health, their community, and the planet.

It is also worth noting that the infrastructure improvements that make walking and bicycling safer for children are also beneficial to adults. A recent study by a scientist at the Centers for Disease Control and Prevention estimated that approximately 65.5 million people living within a half-mile of a school could ultimately benefit from Safe Routes to School projects that improve the environment for walking and bicycling.[14] Researchers have also found that a five percent increase in a neighborhood's walkability leads to a six percent reduction in vehicle miles traveled.[15] Not only are Safe Routes to School programs changing habits of children that will hopefully last a lifetime, they are also building an improved infrastructure to allow more adults to walk and bicycle, compounding the reduction in vehicle mileage and auto emissions, and further improving health and the environment.

Prepared by the Safe Routes to School National Partnership for the Centers for Disease Control and Prevention by Margo Pedroso (author, Policy Manager), with editing by Deb Hubsmith (Director). Design by Melanie Scheuermann, www.melcreative.com.