

## Appendix C. RESEARCH & TECHNICAL DOCUMENTS

### i. Greenhouse Gas Emissions Reduction White Paper

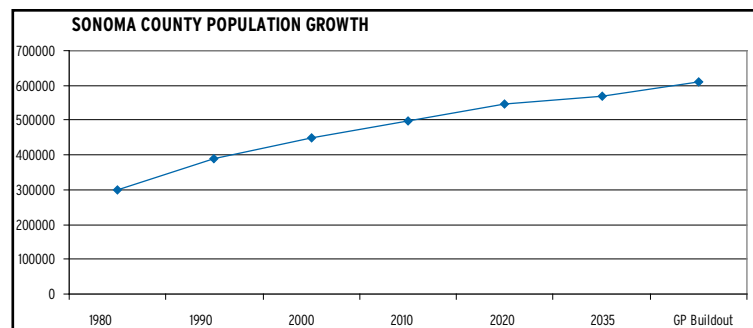
#### INTRODUCTION

##### Purpose

The purpose of this technical memorandum is to provide recommendations to the Sonoma County Transportation Authority (SCTA) Ad Hoc Committee in developing Green House Gas (GHG) reduction policies that will be incorporated into the update of the Countywide Transportation Plan (CTP). All nine cities and the County have committed to reducing GHG emissions and adopted the goal of reducing emissions to 25% below 1990 levels by 2015. This exceeds the California Global Warming Solutions Act of 2006 (AB 32) goal of reducing emissions to 1990 levels by the year 2020. In Sonoma County it is estimated that transportation may be responsible for up to 60% of all man-made GHG emissions.

At the outset, it must be acknowledged that this is an ambitious goal in a growing county. For example, from 1990 to 2020, Sonoma County's population is expected to increase 41%, from approximately 388,000 to 546,000 residents.<sup>1</sup> Much of this growth will occur by 2015, since the growth rate from 2015 to 2020 is expected to be slower. Assuming level per capita emissions, this would result in a 41% increase in GHG. This magnitude is larger than can be offset by any one type of effort or a typical travel demand management (TDM) program, which usually strive for a 5 to 15% reduction in peak hour traffic, sometimes by shifting trips to off peak periods (which provides little benefit in GHG reduction). This is not to say the problem is insoluble, but rather that a variety of different approaches are going to have to be taken if the goals in

the paragraph above are to be achieved. Many of the measures proposed for reducing GHG emissions in this document provide additional transportation or quality of life benefits and will help SCTA meet other CTP goals and address transportation issues beyond climate change. For example, the reduction of VMT, congestion, and average trip length would reduce GHG as well as improve mobility and accessibility, reduce delay related costs to businesses and individuals, improve overall air quality, and put a lower strain on the system allowing it to be maintained more effectively.



##### Scope

The intent of this paper is to provide planners and policymakers with recommendations to consider including in the CTP update to assist in reducing GHG emissions from transportation. It is intended as an overview, rather than an exhaustive study of each of the potential GHG reduction techniques. This paper emphasizes actions that are within Sonoma County and its cities power to control, be it through direct actions or advocacy for policy changes at the State and federal levels.

From a policy perspective, global warming and transportation involves two distinct but related issues:

<sup>1</sup> ABAG's population forecasts are somewhat lower than the County's Draft General Plan 2020. If population growth is interpolated between 2000 and 2015 using the County's figures, the 2015 population would be 524,000, which is 35% greater than the 1990 level.

- Global climate change's impact on transportation infrastructure
- Transportation's impact on global climate change

The first of these is briefly considered in the first part of this paper. It is important because officials should be aware that the costs of maintaining infrastructure are likely to increase as the global climate changes, leaving fewer resources for improving the condition of existing facilities, and expanding the transportation system with new projects.

This paper focuses on carbon dioxide (CO<sub>2</sub>) emissions. They are not the only greenhouse gases—nitrous oxides, methane, and chlorofluorocarbons are also important. Other greenhouse gases can be measured by determining the amount of CO<sub>2</sub> that would have the same global warming potential as a given amount of the greenhouse gas over a given timeframe (Carbon dioxide equivalent—CDE or Equivalent carbon dioxide—CO<sub>2</sub>e). The emphasis in this memorandum is on CO<sub>2</sub> because it is one of the chief GHG emissions produced by motor vehicles, and because CO<sub>2</sub> is long lasting (and therefore more potentially damaging), and the data for CO<sub>2</sub> emissions is readily available. Future efforts and analysis could provide more information on these additional measures of GHG production.

#### **What Can Sonoma County Do?**

This paper is generally focused on direct actions that SCTA member agencies can take to reduce transportation's contributions to GHG emissions though there is an additional component that addresses policy issues the SCTA can advocate for at the State and federal levels such as fuel economy standards, fuel reformulation, and road or carbon pricing.

#### **THE IMPACT OF GLOBAL CLIMATE CHANGE ON TRANSPORTATION INFRASTRUCTURE**

Climate change poses a range of potential threats to transportation infrastructure.

For example, more frequent and intense storms could lead to subsidence/erosion damage to roads and bridges, as well as other transportation facilities. This includes everything from more potholes to road closures and subsidence. The west and north areas of the County would be affected most, because of the topography and soils conditions in those areas are more susceptible to subsidence and flooding, although low-lying areas along the bay (e.g., Highway 37) would also be at risk. Road closures and increased maintenance costs would result from more numerous major storm events. Flooding could close or damage roadways, as has happened in the past in a number of parts of the County, especially the Russian River valley, Petaluma, and in the south/southeast portions of the County at the Marin/Sonoma border and baylands.

A rise in sea level could affect ports and coastal areas, although most roads are well above sea level in Sonoma County. According to the San Francisco Bay Conservation and Development Commission, San Francisco Bay sea level has risen approximately four to five inches in the last 100 years. The rate of rise in recent years is roughly two times the rate observed in the past 100 year period, and the San Francisco Bay is expected to rise another 4-5 inches in the next 50 years (this could be further accelerated by continued global warming). Many of the North Bay Marshland around Sonoma Creek and San Pablo Bay would likely be submerged by increasing sea level rise. Businesses in the county that depend on foreign imports or exports could also be affected, e.g., if there are higher costs of maintaining port operations. Bodega Bay is the County's only port of any size, although it is oriented toward fishing and pleasure craft, rather than commercial shipping.

There may need to be new standards for planning, design, and operation of transportation facilities to reflect the potential change in the environment. For example, roadways are typically planned to be above the hundred year flood level, but if storm events increase in frequency and intensity, consideration may need to be

given to locating them at higher elevations. New perspectives on emergency management, particularly evacuation schemes, need to be developed; the County has considerable experience with this from major events like the floods of 1986, but some of that knowledge may be lost due to the turnover and retirement of emergency response personnel.

### TRANSPORTATION'S IMPACT ON GLOBAL CLIMATE CHANGE

At the global level, transportation's direct contribution to greenhouse gas emissions varies significantly from one world region to another. Carbon dioxide (CO<sub>2</sub>) is the most serious GHG emission from transportation sources and has long a long life in the upper atmosphere. Globally, the largest sources of CO<sub>2</sub> emissions are transportation, industry, electric power generation, agriculture/farm operations, and residential heating.

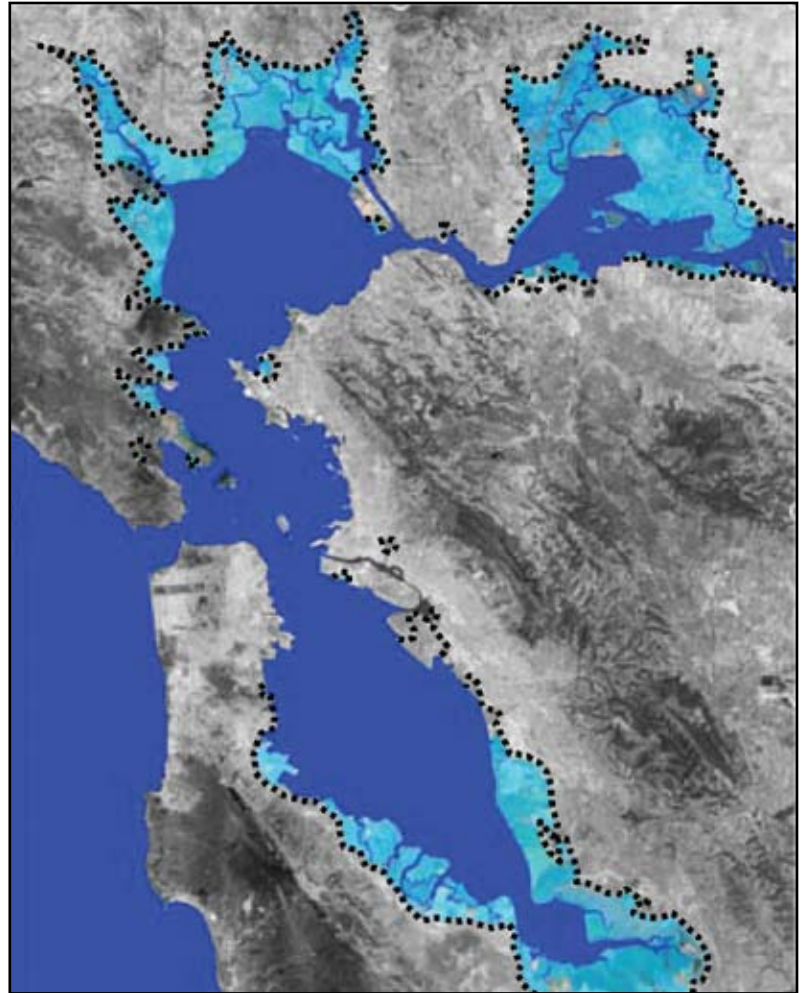
Transportation may account for 15 to 25% of all CO<sub>2</sub> emissions worldwide, but because we tend to drive more and burn less coal relative to other places in the world, in places like the Bay Area transportation accounts for a considerably higher share of all CO<sub>2</sub> emissions. In Sonoma County, it is estimated that transportation is responsible for up to 60% of CO<sub>2</sub> emissions because of a mild climate, a modest industrial base, controls on agricultural burning, and an absence of fossil-fueled power plants (Climate Protection Campaign).

### EMISSION ESTIMATES FOR SONOMA COUNTY MOTOR VEHICLES

Based on data published by Caltrans,<sup>2</sup> Sonoma County residents traveled 3.89 billion miles in vehicles in 2005, and consumed 208.3 million gallons of motor fuel (gasoline and diesel). Using conversion

<sup>2</sup> Motor Vehicle Stock, Travel, and Fuel Forecast (MVSTFF) Report, Division of Transportation System Information, December 2006 (issued annually). This is the most recent version; the 2007 update had not been released at the time of writing.

### SAN FRANCISCO BAY PREDICTED SEA LEVEL RISE



factors provided by MTC<sup>3</sup>, this results in an estimate of 1.87 million metric tonnes<sup>4</sup> per year of CO<sub>2</sub> emissions. The Clean Air and Climate Protection Software (CACPS)<sup>5</sup> package estimates 2.24 million tons equivalent CO<sub>2</sub> produced for this period. Assuming the same mix of gasoline and diesel was present in 1990; this is an increase of nearly 17% from 1990 levels, when 1.60 million metric tonnes were pro-

<sup>3</sup> 19.4 pounds of CO<sub>2</sub> per gallon of gasoline, and 22.2 pounds per gallon of diesel fuel.

<sup>4</sup> A metric tonne is approximately 2,200 pounds, or 1,000 kg. The spelling distinguishes it from a 'short' ton (2,000 pounds). Most documents on GHG use metric tonnes (sometimes abbreviated MT), so to aid in comparison, the same units have been used here.

<sup>5</sup> CACPS software developed for ICLEI (International Council for Local Environmental Initiatives, STAPPA (State and Territorial Air Pollution Program Administrators, and ALAPCO (Association of Local Air Pollution Control Officials).

duced (2.07 million tons equivalent CO<sub>2</sub>). Part of the reason that CO<sub>2</sub> emissions did not grow as fast as population was that there were improvements in vehicle fuel economy in that period. In 2006, Caltrans predicted that fuel economy will continue to improve through 2015, but will level off after that time. This was before the recent changes in the fuel economy standards (CAFÉ). Between 1990 and 2005, the County's population grew from 388,200 to 478,800, or approximately 23%.<sup>6</sup>

Assuming no policy intervention (or "business as usual"), and the older fuel standards, Caltrans data point toward CO<sub>2</sub> emissions in Sonoma County from motor vehicles increasing to 2.53 million metric tonnes in 2020, and 3.01 million metric tonnes in 2030 (roughly 3.03 and 3.61 million equivalent CO<sub>2</sub> in 2020 and 2030). The year 2020 is an important benchmark, because AB32 (Nunez) calls for a reduction of actual 2020 emissions to the estimated 1990 levels. This would require a reduction of almost 37% in vehicle emissions, equivalent to a reduction of 930,000 metric tonnes per year (approximately 960,000 tons equivalent CO<sub>2</sub> per year). SCTA's adopted policy is even more stringent, and will require a reduction of 1,350,000 tons equivalent CO<sub>2</sub> per year and a reduction of approximately 1.5 billion vehicle miles traveled (VMT) per year by 2015.<sup>7</sup> These figures take on greater importance if carbon offsets were used to meet part of the goal, as discussed later in this paper.

### **PROPOSED STRATEGIES FOR REDUCING CO<sub>2</sub> EMISSIONS FROM MOTOR VEHICLES**

Many of the policy solutions that reduce CO<sub>2</sub> require a concerted and sustained effort at all levels of government: local, regional, state, and federal. There are three types of actions that local governments in Sonoma County could consider:

- Those that can be implemented locally. An example is expanded transit service.
- Those that could be implemented if the appropriate changes were made in state and/or federal legislation. Examples of this include high occupancy toll (HOT) lanes and/or pricing on Highway 101, and incentive or mandated employer-based TDM programs.
- Those that require advocacy in order to be implemented as it falls outside the authority of local governments. This includes such things as low carbon fuels for the entire vehicle fleet, electric vehicles, and changes to CAFÉ standards, etc.

This paper focuses on the first group of actions, although also provides discussion of some of the policies and legislative changes that the County and the cities could support to bring about more significant change. Several large cities, such as Portland, Oregon; Seattle, and New York City have been pioneers, independent of the federal government, in reducing CO<sub>2</sub> emissions. For example, New York, which has a large taxicab fleet, will require all cabs to be hybrids by 2012, and will plant one million new trees as part of its CO<sub>2</sub> reduction program.

There is an ongoing debate among transportation professionals as to whether the solution to reducing transportation's contribution to GHG emissions lies primarily in technology changes to the vehicle fleet, or major changes in life style, behavior, and land use patterns. It is clear that any policy that seeks to reduce transportation-related carbon dioxide emissions will require some combination of better vehicle fuel technology, improved vehicle fuel economy, and reductions in vehicular travel.

Most of the changes in technology require federal and or state legislation that SCTA can support through its legislative program. However, SCTA has the opportunity to take a more direct role in reducing travel demand. Strategies to reduce travel demand will likely need to do two things:

<sup>6</sup> 1990 population is official US Census figure; 2005 is from ABAG Projections 2007.

<sup>7</sup> These figures represent a reduction below projected 2015 conditions.

reduce energy use per unit of distance traveled and decrease per capita distance traveled. Although improvements in fuel and vehicle technology can help, land-use and transportation planning that reduces vehicle demand is crucial, especially in light of population growth. This approach is consistent with the overarching principles the SCTA board reviewed and approved at its July meeting.

The following is a list of direct and indirect measures that could be employed by Sonoma County to reduce GHG emissions. A more comprehensive list of possible GHG mitigation measures is being prepared as part of the SCTA Comprehensive Transportation Plan (Strategies Matrix). We recognize that no single measure will provide the “silver bullet”, and that these measures will need to be combined into a comprehensive GHG reduction program.

- Transportation Demand Management
- Vehicle Fuels
- Vehicle Efficiency
- Land Use
- Parking
- Transit
- Bicycle and Pedestrian
- Intelligent Transportation Systems/ Signal Timing Improvements
- Congestion Reduction
- Accelerated Vehicle Replacement
- Carbon Offsets

### Transportation Demand Management (TDM)

Travel demand, at its most basic level, is the result of a desire to engage in an activities (work, shopping, recreation, etc.) that are physically separated from one’s present location. Sometimes this demand is virtually mandatory (e.g., going to work five days a week); sometimes it is flexible (we need to buy groceries, but can easily decide where and when to do so); and sometimes it is optional (we drive to the beach because it’s a warm day and

because we like the ocean). There are many ways to measure travel demand, but most frequently it is by the vehicle miles or vehicle hours traveled. Increasingly, there are in-home substitutes available as an alternative to travel, e.g., we can shop on-line, or we can have a DVD mailed to our house rather than drive to the movies.

TDM programs represent a variety of measures that transportation planners have developed over the past 40 years in an effort to reduce single occupant vehicle use, travel demand, and overall VMT, at a relatively low cost. They generally fall into five broad categories:

- Increased options for commuters
- Market based (pricing) strategies
- Time of travel shifts
- Improving traffic flows
- Regulation of parking and driving

TDM measures are usually applied at the employment end of the trip, where they are most effective. In the mid-1990s the state legislature prohibited mandatory employer-based in most of California. However, several cities and employers in Sonoma County have voluntary TDM programs and many employers have informal approaches to TDM style programs.

TDM typically works best with large employers, as there are economies of scale to an informational program. Employers with more than 50 or 100 employees are usually the best “target audience” for TDM. One of the challenges of applying TDM programs in Sonoma County is that the employment structure tends to be one of many small employers. The 2005 County Business Patterns revealed that of the 13,847 private-sector business establishments (work places) in the county, only 229 had 100 or more employees, and only eight establishments had more than 1,000 employees.<sup>8</sup>

<sup>8</sup> One employer could have more than one “establishment,” e.g., if a grocery store chain had 10 stores in the county, it would be counted as 10 establishments. Because the data are based on social security payroll information, it excludes most governmental employees.

### Vehicle Fuels

Biofuels (ethanol, biodiesel, biomass, cellulose) can be encouraged as alternatives to petroleum-based fuels because they emit less carbon dioxide per gallon burned. Gasoline reformulation may also be capable of reducing CO<sub>2</sub> emissions by 10% per gallon consumed. Care must be taken when implementing wide spread use of Biofuels. Increased use of these types of fuels could have adverse impacts on worldwide food supply and food prices.

### Vehicle Efficiency

Vehicle efficiency: Regulations and incentives for improved fuel economy are the primary policy tools to address vehicle fuel efficiency. Besides improvements to existing gasoline powered vehicles, it could include electric, hybrid, or other low-emission technology vehicles. CO<sub>2</sub> emissions are directly proportional to the fuel economy of a given vehicle; doubling fuel economy (even with no change in miles driven) will halve the CO<sub>2</sub> emissions.

### Land Use

Many—perhaps most—local jurisdictions in Sonoma County have included policies in their general plans encouraging higher densities, which as a by-product, promote many of the goals of GHG reduction. Land use policies to promote GHG emissions need to incorporate the 4 “D”s: density, diversity, design, and destinations. SCTA could continue to work with its local jurisdictions to identify opportunities for complementary land use and transportation projects around major transit hubs, such as SMART stations or important bus transfer centers.

Housing affordability is an increasingly important issue in Sonoma County. As housing costs increase, workers are forced to live further from workplaces in an effort to find suitable and affordable housing. Those employed in the county should have affordable housing opportunities so that they can live near where they work. A balance of jobs and suitable housing has great potential to reduce trip lengths and frequencies and thereby

reduce transportation related GHG emissions. Loan programs or other financing tools may provide assistance in this area.

### Parking

Although parking is not directly under SCTA's control, it plays an important role in influencing travel, and is within the purview of local jurisdictions. Parking supply in new development is usually determined by parking codes, some of which have remained unchanged for many decades. Many parking codes were last visited in the 1960s and 1970s, and are often a “set and forget” part of local government codes.

Excess parking increases development costs, makes places less pedestrian friendly, encourages driving, and reduces the effective density of land uses. As a result, some cities have reduced their minimum parking standards where it seemed appropriate, or created minimum and maximum standards to discourage excess parking. Charging for parking is another way to affect mode shares, although it is likely to be politically unpopular, especially in a place like Sonoma County where parking has been free nearly everywhere except in downtown Santa Rosa and the Junior College. Drivers are more accustomed to paying for parking when parking is in a structure than on the surface.

### Transit

The 2000 Census indicated that 2.3% of Sonoma County residents regularly used transit to travel to and from work. Although the margin of error in this estimate is +/- 0.6%, this still represents a small fraction of all commuters. For all trip purposes, transit carries perhaps 0.5% of all trips. On a positive note, this is higher than the percentage found in many other low-density counties across the country, and transit does perform much better in selected markets. For example, approximately 8.2% of inter-county trips (mostly to Marin and San Francisco counties) are made by transit. Generally, the longer the trip the more amenable it is to transit.

This also points out the unintended consequence of policies encouraging job creation within Sonoma County: as the share of workers commuting to jobs outside of the county decreases, the more difficult it is to “capture” commute trips on transit. The County has long had the laudable goal of encouraging shorter, in-county commute trips, to the point where Sonoma County has one of the lowest percentages of any Bay Area county for “out-commuters.” However, this policy has worked counter to increasing transit mode shares, because of the difficulty of serving dispersed job locations in Sonoma County. From an individual’s standpoint, taking a bus to a job in the San Francisco Financial District makes a lot of sense; taking a bus from one’s home in Bennett Valley to a job in the Santa Rosa Corporate Center does not, at least if one has a car.

Density improves the efficiency of transit, yet transit service and use must be balanced with how much public resource can be devoted to expansion. Most studies (see Pratt, 2000) indicate that doubling the frequency of bus service on a given line will typically yield only 50% more riders. For example, consider an existing bus route operating every 30 minutes and carrying 400 daily riders. Increasing the frequency of service to every 15 minutes would probably result in about 200 new riders (600 total). Because Sonoma County is starting at a very low base (2-3% transit mode share), achieving a significant transit mode share (5-10%) might require tripling or even a six-fold increase in the number of buses being operated compared to current levels. This would require significant new sources of revenue.

### **Bicycle and Pedestrian Improvements**

Implementation of Bicycle and Pedestrian access improvements as prioritized in the Bicycle and Pedestrian Master Plan should be an important goal of the CTP. As quoted from the draft updated SCTA Countywide Bicycle and Pedestrian Plan:

“Each time a Sonoma County resident, worker or visitor chooses to travel by

bicycle or on foot rather than to drive, they are reducing fossil fuel consumption, thereby decreasing their contribution to air pollution and global climate change. Walking and bicycling are the ultimate clean air, zero emission transportation modes, which also reduce water pollution because vehicular oil drips are a significant source of water pollution.

The benefits of walking and bicycling to the environment are particularly strong on short trips—two miles or less. For example, 60 percent of emissions that contribute to smog are released in the first few seconds of a one-mile trip. A 2006 study by Analy High School students revealed that 40 percent of students who live less than one mile from the Sebastopol campus drive alone to school. Although Sonoma countywide data isn’t available, nationally, 13 percent of trips are less than one-half-mile, considered to be a comfortable walking distance, and over one-third of trips are within convenient bicycling distance, less than three miles long. As more motor vehicle trips are replaced with bicycling and walking, Sonoma County’s air will become cleaner, and the County will contribute less to global climate change, making measurable progress towards meeting its greenhouse gas reduction goal.”

### **Intelligent Transportation Systems/ Signal Timing Improvements**

Intelligent transportation systems (ITS) is defined as the application of advanced electronics and communication technologies to enhance the capacity and efficiency of surface transportation systems, including traveler information, public transportation, and commercial vehicle operations. Perhaps one of the most promising techniques for reducing vehicle fuel and energy consumption is that of simply re-timing traffic signals on a regular basis (typically every three to five years, depending on how much traffic conditions may have changed). Some years ago, the California Energy Commission had a program known as the FETSIM (Fuel-Efficient Traffic Signal Management) program to provide local government

with funds to accomplish this. Proposition 1B funds are currently being used for better traffic light synchronization, but primarily for hardware purchases.

Better timing of traffic signals can reduce the number of vehicle stops and idling, and thereby reduce energy consumption and GHG emissions. The size of the reduction is small, but it is a relatively easy one to do and is highly cost-effective.

### Congestion Reduction

Congestion also contributes to excess energy consumption and GHG emissions. Motor vehicles operate most efficiently (lowest fuel consumption and emissions per mile) at steady speeds of around 45-60 mph (ORNL, 2007). Stop-and-go traffic contributes to excess GHG emissions. As an example of the benefit of congestion relief on GHG, consider a congested four lane freeway, where two HOV lanes are added (total six lanes in both direction), and the average peak period travel speed increases from 20 mph (before improvement) to 30 mph (after adding HOV lanes). The reduced fuel consumption would be equivalent to approximately 2,850 tonnes per year of CO<sub>2</sub>. This example assumes that no entirely new trips would be induced by the improvement, an assumption that seems justified given the relatively modest increase in speeds.

The following measures could be employed to reduce congestion in Sonoma County:

- Complete HOV lanes on HWY 101
- Implement Signal Timing and other ITS measures
- Shift trips to less congested periods (flexible work schedules)
- Shift trips to alternative transportation modes (transit, bicycle, pedestrian)
- Encourage telecommuting and carpooling

### Accelerated Vehicle Replacement

The objective here would be to accelerate the pace at which new, lower emission vehicles are introduced into the vehicle fleet. Most municipal vehicle fleets are already fairly new and efficient, and many of the trucks that operate in Sonoma County may be based elsewhere. Public school buses are probably the largest fleet still operating older vehicles.

Incentives could be provided for Sonoma County public school districts to replace vehicles with newer, more fuel efficient, and less polluting buses. Sonoma County's school bus fleet had more than 400 vehicles in 2006.<sup>9</sup> The Sonoma County Office of Education, which operates approximately 80 of those vehicles, has indicated that the average age of its small buses is approximate 13 years, and large buses average approximately 20 years old.

There are a variety of options for replacement vehicles, including vehicles with greater fuel efficiency or alternative fuel buses (compressed natural gas, hybrid, biodiesel). According to the "Biodiesel for Schools" website ([www.biofuels4schools.org](http://www.biofuels4schools.org)), West County Transportation Agency will begin using 20% biodiesel (B20), resulting in a reduction of more than 145 metric tonnes per year.

A broader program, targeted at the general public, could provide incentives, such as a cash rebate, to any buyers of very fuel efficient vehicles (such as hybrids). There are currently some tax incentives to encourage this, and some private companies have also offered programs as an employee benefit (e.g., Google and Timberland shoes do this, typically with a rebate of between \$1,500 and \$5,000 per vehicle).

### Carbon Offsets

Carbon offsets are purchases made by one entity (the buyer) who are willing to pay another party (the seller) to reduce

<sup>9</sup> Information provided by Michael Murphy, Bay Area Air Quality Management District. Because the Air District does not include Healdsburg and Cloverdale, the figure does not include school buses in those areas.

GHG emissions elsewhere. In essence, buyers are paying someone else to reduce GHG emissions in their stead. A similar system has been successfully used for some years to reduce acid rain. The current price for carbon offsets is \$10-\$15 per tonne.<sup>10</sup> The equivalent price, if added to the retail price of gasoline, would be on the order of 11 cents per gallon.<sup>11</sup> Because CO<sub>2</sub> is a global problem, the offsets might occur anywhere in the world, since a ton of GHG reduction is the same regardless of where it is produced. Several organizations, both non-profit and for profit, have been formed in recent years to sell carbon offsets.<sup>12</sup>

Advantages of using carbon offsets for GHG reductions are that:

- They are economically efficient—the attraction being that a buyer having a high cost/ton of carbon reduction can buy an offset from another party having a lower cost/tonne of reduction, and achieve the same basic result of reducing emissions
- They don't represent a long term investment by the buyer, and so can be used for short periods of time to make up for deficiencies

Some disadvantages of carbon offsets are:

- They have low visibility, because the reductions might occur outside Sonoma County (in fact, they might occur anywhere in the world)
- The projects must be truly in addition to what would have been done without the purchase of the offset
- Strict accounting and monitoring is required to ensure offsets are not “double counted” (i.e., two purchasers buying the same offset)
- The offset projects must be verifiable and permanent (e.g., planting

trees may be a good mitigation, but may die or be cut later)

- The costs of purchasing offsets, depending on their magnitude, could diminish funds available for making transportation improvements, perhaps significantly

The SCTA may want to consider the purchase of carbon offsets as the last resort for mitigating GHG impacts, and that all other options should be explored and exhausted before deciding to use this method for mitigating carbon emissions in Sonoma County. If the purchase of carbon offsets is deemed necessary, local offsets within the County of Sonoma should be a priority.

## RECOMMENDATIONS

The policy solutions that reduce GHG emissions, and will allow SCTA and local jurisdictions to meet county and regional GHG reduction goals, include a variety of approaches and may require a concerted and sustained effort at varying levels of government. Proposed policies have been split into those that can be implemented at the local level, and those that will require advocacy at the regional, state, or federal level. A more complete list is in Appendix A-iv–2008 Comprehensive Transportation Plan Strategies Matrix.

### Local Efforts:

- Give high priority to projects and programs that demonstrate the ability to reduce fuel consumption and emissions.
- Improve roadway and off-road bicycle and pedestrian facilities and paths.
- Promote and seek funding for Safe Routes to Schools Projects.
- Increase and improve bus transit service.
- Implement a regional transit “backbone” using Bus Rapid Transit (BRT) and Rail Transit Service (SMART).
- Implement preferential treatment for buses on local roadways.

<sup>10</sup> Quoted from presentation by Alex Farrell, Associate Professor, University of California, Berkeley, 1/14/08. Other estimates range from \$5 to \$40 per tonne.

<sup>11</sup> 208.3 million gallons gas and diesel per year/(1.87 million metric tonnes CO<sub>2</sub> per year\*\$10 offset per tonne) = 11.14 cents per gallon.

<sup>12</sup> Examples include TerraPass ([www.terrapass.org](http://www.terrapass.org)) and Carbon Fund ([www.carbonfund.org](http://www.carbonfund.org)).

- Fund improved transit information and marketing programs.
- Support high density development around transit hubs.
- Develop transportation investment criteria that supports 4-d development strategy (density, diversity, design, destinations).
- Implement housing assistance program to aid employees in finding adequate housing near employers.
- Increase ridematching services and park and ride capacity.
- Review parking codes, and support increased parking costs.
- Review land use codes, and support reforms that encourage compact mixed use development, infill, and carbon efficient design.
- Provide incentives for employers implementing TDM programs.
- Promote telecommuting and compressed work schedules.
- Support development of Carsharing Programs.
- Complete Sonoma County's portion of the regional HOV network.
- Support Local and Regional Intelligent Transportation System (ITS) development (Signal improvements, turn restrictions, etc.)
- Support development of non-highway, carbon efficient goods movement.
- Repeal Section 40717.9 of the Health and Safety Code which restricts local governments from requiring that employers implement a trip reduction program.
- Support efforts to implement congestion pricing, including HOT lanes, tolling and road pricing.
- Support efforts to increase the fuel economy standards beyond the 35 mpg recently passed by Congress in the Energy Independence and Security Act of 2007.
- Support efforts to improve fuel consumption and emission standards for commercial vehicles.
- Support efforts to increase freight fees to address air quality issues.
- Purchase Carbon Offsets if necessary.

#### **ADVOCACY EFFORTS:**

- Support efforts to implement technologically-based fuel economy improvements, such as low carbon fuels, hybrid vehicles, etc.
- Support efforts to increase and index gas taxes.
- Require major new transportation projects to analyze its GHG emissions as part of the environmental process.
- Support efforts to garner an EPA exemption to allow California to set standards for GHG from motor vehicles.

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