CLEANING THE AIR, GROWING SMARTER

Transportation and Land Use Changes to Improve Public Health in Contra Costa County
The Transportation and Land Use Coalition (formerly BATLUC, the Bay Area Transportation and Land Use Coalition) is a partnership of over 90 groups working for a sustainable and socially just Bay Area. We envision a region with healthy, vibrant, walkable communities that provide all residents with transportation choices and affordable housing. The coalition analyzes county and regional policies, works with community groups to develop alternatives, and coordinates grassroots campaigns.

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Programs to reduce air pollution in the Bay Area have often focused on whether the region meets or exceeds maximum levels of ozone (smog) set by the state and federal regulators. But Contra Costa County residents are being exposed to another dangerous – and growing – air pollution threat: particulate matter. These tiny pieces of dust get lodged deep in people’s lungs and cause an array of health problems.

At the end of the so-called “smog season”, air quality officials celebrated the news that this year the nine-county Bay Area had only one violation of federal smog regulations. By contrast, for the past decade Contra Costa County alone has averaged 18 days per year that it exceeded the state’s standards on particulate matter. And while regulators expect emissions of many other pollutants to drop, they expect Contra Costa’s particulate matter pollution to keep growing with no end in sight.

Changes in engine technology, which regulators have focused on to address other air pollution concerns, has helped reduce emissions of carbon monoxide and smog-causing pollutants such as nitrogen oxides (NOx) and reactive organic gases (ROG). But technology can’t fix the problem of tiny particles released during driving, because 89% of it is road dust that is kicked up by vehicles; only a small fraction is released from tailpipes. The only way to significantly reduce particulate emissions – and the health effects – from reentrained road dust is to reduce driving.

High levels of particulate matter are known to increase asthma attacks and symptoms in both children and adults, and may be a contributing factor causing asthma in otherwise healthy individuals. Other public health problems associated with high levels of particulates include pneumonia, heart disease, and chronic obstructive pulmonary disease. More Californians die each year from particulate air pollution than from car accidents, murder and AIDS combined.

These air pollution problems hit disadvantaged communities the hardest. This report studied eleven low-income and minority communities in the county for air pollution levels and associated health impacts. These environmental justice communities – Richmond, San Pablo, North Richmond, Hercules, Rodeo, Martinez, Concord, Bay Point, Pittsburg, Antioch, and Brentwood – have 22% of the county’s population but are home to 63% of the county’s people-of-color and 44% of its low-income households.

These communities bear a double burden of air pollution, a combination of elevated industrial and transportation-related pollution. Not only is every environmental justice community in Contra Costa located by or near a major roadway, but all of the top 20 industrial sources of air toxics in the county also lie in and around these communities. Contra Costa is out of attainment with the state standards for particulate matter, and the county’s monitoring stations in Concord and Pittsburg record some of the highest levels of ozone and particulates in the region.

Not surprisingly, these environmental justice communities all have higher asthma rates than the county average. The problem is worst in Richmond, where asthma rates are two and half times higher than the rest of the County. Children and people-of-color are most at risk: African-
American children in Contra Costa are hospitalized for asthma four and a half times as often as white children.

Particulate matter emissions pose a growing health crisis, and Contra Costa’s leaders need to address it aggressively. But Contra Costa has not focused on stemming the growth in vehicle travel, the primary source of the continuing growth in particulates. Between 1980 and 2000, the daily vehicle miles traveled on Contra Costa’s roadways increased by 78%, nearly twice as fast as population growth - 42%. Sprawl development and a lack of transportation choices, fostered by county and regional transportation and land use policies, have forced people to spend increasing amounts of time in their cars driving to increasingly distant destinations. At the same time, the financial costs drivers face fails to reflect the true health and environmental costs vehicle travel places on our communities.

CLEANING THE AIR, GROWING SMARTER presents specific policies, programs and investments that Contra Costa’s leaders can take to reduce the public health impacts of the transportation system and land use patterns that are contributing to the rapid increase in vehicle travel:

- **Design Communities for People, Not Just for Cars.** Reining in sprawl and supporting transit and downtown-oriented affordable housing are essential to stem residents’ increasing dependence on vehicle travel for non-work trips such as shopping, school, and recreation as well as the growing length and aggravation of the daily commute. These and other smart growth policies can reduce vehicle travel, improve air quality, and help channel investment into existing communities. Success will depend on improving Measure C’s Growth Management Program and funding the smart growth incentive program as well as leaders’ commitment to implement *Shaping Our Future*, the joint city-county effort to plan for smarter growth.

- **Provide Viable Alternatives to Driving: Mass Transit, Bicycle & Pedestrian Access, and Ride-Sharing.** With traffic congestion skyrocketing, Contra Costa commuters need new transit alternatives. These should include a comprehensive express bus network, new eBART stations surrounded by compact, mixed-use developments, and local feeder bus service. The county must also provide better access and safety for pedestrians and bicyclists and encourage ride-sharing. A strong commitment to alternatives to driving in the new Measure C’s expenditure plan and passage of legislation to improve mass transit by raising tolls on state-owned bridges (SB 916) are both essential to achieving these improvements.

- **Optimize the County’s HOV Network.** To fill gaps in the county’s high-occupancy vehicle (HOV) lane network, transportation officials should consider converting existing mixed-flow lanes to high-occupancy toll lanes or carpool lanes on State Route 24 and Interstate 680 and building a reversible carpool lane on State Route 4 East.

- **Set transportation prices to reflect the true costs of driving.** Pricing mechanisms such as gas taxes, bridge tolls, and parking charges would help reflect the true cost of driving. Combined with financial incentives to use alternatives, these pricing mechanisms are key strategies to decrease vehicle travel, congestion, and improve air quality. These charges could help raise new revenue for transportation improvements, or be used to reduce other taxes, such as sales or property taxes. The Bay Area’s air district should follow San Joaquin’s example and adopt a development impact fee to fund programs that offset the air pollution impacts caused by new development.
Promote Cleaner Vehicles and Fuels. Cleaner fuels and vehicles can reduce the harmful public health effects of vehicle use, and some of these improvements can be targeted to diesel trucks and buses, which have a significant impact in low-income communities. Still, technological improvements have their limitations and cannot be relied upon to reduce particulate emissions, one of the greatest health threats facing the county from vehicle travel.

In addition, the report presents several recommendations for reducing vehicle travel specifically within the county’s environmental justice communities:

- **Adopt Specific Plans for Transit Villages.** To promote transit-oriented developments, cities, the county, and transit agencies should team up to develop Specific Plans for key areas such as Pittsburg/Bay Point BART, Concord BART, North Concord BART, Martinez Intermodal, San Pablo Avenue Rapid Bus corridor, and the proposed eBART stations.

- **Manage Truck Traffic to Reduce Air Pollution.** Through their own actions or by pressure on industrial and other facilities, cities could seek to reduce the harmful air pollution impacts of diesel truck traffic by using cleaner vehicle technology, replacing truck trips with rail trips, and improving the efficiency of fleet operation.

- **Target Contra Costa Clean Fuel Vehicle Project to Environmental Justice Communities.** The county should increase funding for the Contra Costa Clean Fuel Vehicle Project and target investments to help environmental justice communities to purchase and convert to alternative fuel vehicles and retrofit old diesel engines.

Over the next few years, residents will have a tremendous chance to pursue these recommendations. With potential funding sources such as the bridge toll and the new Measure C slated for 2004, and with initiatives such as *Shaping Our Future*, Contra Costa has the opportunity to fundamentally shift its approach to transportation and land use and create a transportation future that improves both air quality and public health. By designing communities for people, not just for cars, providing residents with viable options and reasons to switch from driving to mass transit, bicycling, and walking, and by promoting clean fuels and vehicles for those who must drive, the county can decrease the exposure of all residents to the harmful health effects of pollutants such as particulate matter, toxics, and ozone.
Introduction

The ability to breathe clean air is a basic environmental right and an important contributor to public health. While air quality has improved in many areas of our country since 1970 when the Clean Air Act was passed, air pollution still remains an environmental threat to millions of Americans, increasing the risks of numerous health problems. Poor air quality is widely known to exacerbate asthma attacks and symptoms in both children and adults. In addition, long-term exposure to air pollution may be a contributing factor causing asthma in otherwise healthy individuals. Other public health problems associated with emissions of air pollutants include premature death, cancer (including childhood cancer), heart attacks, strokes, and high blood pressure.\(^1\) Dealing with our nation’s air pollution and the contributors to poor air quality should be among the foremost environmental and health-related initiatives on the public policy agenda.

Transportation’s impact on air pollution can easily go unseen, built up day by day, mile by mile through the unrelated actions of many individuals going about their daily lives. Yet the combination of all these daily miles and individual trips constitutes one of the most important sources of air pollution in California. Contra Costa County daily witnesses a large and growing amount of travel on its multiple interstate and state highways, many of which are within – or adjacent to – low-income and people-of-color communities. Several of these communities also bear the double burden of pollution from major industrial facilities in addition to transportation-related emissions. Too many of these communities face high pollutant concentrations and associated negative health impacts. Any strategy that seeks to diminish the unfair environmental burden placed upon communities living near major sources of vehicle travel must address that travel as a key issue contributing to poor air quality.

This report will trace the linkages between transportation, air quality, and community health. Chapter 1 identifies those pollutants for which transportation is a major source and describes their health impacts, current levels, and historical and forecasted trends. Based on these characterizations of the pollutants, Chapter 2 turns to an analysis of the communities that are most affected by these emissions from vehicle travel. Having diagnosed the problem and pinpointed some areas where it is of particular concern in the second, Chapter 3 proposes transportation strategies and programs that can address these air quality and environmental justice issues. Each of these recommendations, in some form or another, will address this linkage between emissions and vehicle travel, recognizing that, in certain cases, the best way to reduce the former is through a reduction in the latter.
Transportation’s Contribution to Air Quality and Public Health

Many types of pollutants from vehicle travel contribute to poor air quality. Four “criteria pollutants” – defined as an air pollutant regulated by a national ambient air quality standard – constitute a major environmental and health issue that is in large part due to local and regional vehicle travel. These are particulate matter (PM), carbon monoxide (CO), and the ozone precursors nitrogen oxides (NOx) and reactive organic gases (ROG). In addition to criteria pollutants, toxic emissions pose another serious local and regional health threat due to emissions from motor vehicles and various industrial and commercial facilities. Three toxic pollutants from motor vehicle fuel combustion – diesel particulate matter (“diesel PM”), benzene, and 1,3-butadiene – are the top contributors to the health risk from toxics in California. Table 1 lists the levels of these criteria and toxic pollutants in Contra Costa by emission source and shows that, for each pollutant listed, transportation-related sources (composed of on-road and other mobile sources) contribute to more than 45% of total emissions. Transportation is also a major source for the emissions of greenhouse gases (GHGs), the most significant being carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), all of which contribute to the worldwide problem of global climate change. With its reliance on motor vehicle travel – in 2000, according to the U.S. Census, 70% of Contra Costa residents commuted to work via single-occupant vehicle (SOV) – the county is not only polluting its own air, but is also playing a role in the gradual rise of the earth’s temperatures.

Table 1: 2001 Criteria and 1996 Toxic Pollutant Levels by Source, Contra Costa

<table>
<thead>
<tr>
<th>Source</th>
<th>Criteria Pollutants (Tons/Day)</th>
<th>Toxic Pollutants (Tons/Day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PM10</td>
<td>ROG</td>
</tr>
<tr>
<td>On-Road Mobile Sources*</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Other Mobile Sources</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Stationary Sources</td>
<td>5</td>
<td>34</td>
</tr>
<tr>
<td>Area-Wide Sources</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>89</td>
</tr>
</tbody>
</table>

*Includes transportation-related area-wide source emissions (paved and unpaved road dust)

Source: California 2002 Almanac of Emissions and Air Quality and 1996 Toxics Inventory

This chapter discusses the impacts, levels, and trends for each of the above-mentioned pollutants in Contra Costa. Beginning with the most significant transportation-related air quality threat facing the county, that of coarse and fine particulate matter emissions, the chapter then considers each pollutant in terms of its relative public health threat, with those having a greater potential threat being considered first. In this way, after particulate matter, the chapter examines the three major air toxics associated with transportation followed by ozone, or smog. The chapter concludes by briefly summarizes information about carbon monoxide and greenhouse gas emissions.
PARTICULATE MATTER
By far the largest source (more than 40%) of coarse particulate matter (PM10) in Contra Costa in 2001 came from on-road mobile sources (see Table 1). PM particles are composed of various combinations of small droplets of liquid, solid cores with liquid coatings, and dry solid fragments such as metals, soot, soil, dust, and sulfate particles. PM may be divided into many size fractions, measured in microns (a micron is one-millionth of a meter). ARB and USEPA regulate two size classes of particles – course particles up to 10 microns (PM10) and fine particles up to 2.5 microns in size (PM2.5). PM2.5 particles are the most harmful subset of PM10. Particulate matter, whether emitted via tailpipe or created as road dust, tends to be characterized by relatively local dispersion. The smaller the particle, however, the farther it travels, so PM2.5 tends to disperse over greater distances than does PM10.

Particulates and Public Health
When a person inhales, fine particles penetrate into the airways and lungs. As particles travel through the respiratory system along with the inhaled air, they can stick to the sides of the airways or travel deeper into the lungs. While lungs attempt to trap and remove these particles by producing mucous, smaller particles may evade this defense and penetrate very far into the lungs. This is one reason why PM2.5 is of particular concern. PM2.5 has been found to cause death and other health problems. It has recently been discovered that very small particles can even change blood chemistry and cause problems with the electrical impulses for the heart.

Particulate concentrations are associated with higher admissions to hospitals for respiratory problems and with increased mortality, particularly from respiratory and cardiovascular diseases. Harvard University researchers followed the health of more than 8,000 people in six small cities that fell along a gradient of air pollution concentrations for a period of 14 to 16 years and found an almost directly proportional correlation between PM concentrations and the death rate in the residents studied. Specifically, residents of the most polluted city in the study had a 26% increased risk of premature mortality due to a difference in ambient fine particle concentrations of 18.6 micrograms per cubic meter (μg/m³) compared to the residents of the cleanest city studied. In another study, the American Cancer Society reported a 17% increase in premature mortality cases by cardio-pulmonary and other causes due to a difference of 24.5 μg/m³ between the cleanest and dirtiest cities studied. In addition, the National Morbidity, Mortality, and Air Pollution Study found that for each 10 μg/m³ increase in PM10, there was approximately a 1% increase in hospital admissions for cardiovascular disease, and about a 2% increase in admissions for pneumonia and chronic obstructive pulmonary disease. A 2002 study by the Environmental Working Group (EWG) determined that more Californians die each year from pollution from airborne soot and dust than from homicide and AIDS combined.

Particulates in Contra Costa
Contra Costa’s particulate matter emissions give it some of the highest concentrations of PM10 in the Bay Area. In the past decade (1993 to 2002), Contra Costa averaged over 18 days a year with PM10 concentrations above the state standard of 50 μg/m³ per 24 hours. Figure 1 presents the maximum 24-hour average PM10 concentrations recorded during 2001 at selected Bay Area Air Quality Management District (BAAQMD) air quality monitoring stations. As seen in the figure, monitoring stations in Contra Costa and in nearby Livermore recorded some of the Bay
Area’s highest maximum 24-hour average PM10 concentrations in 2001. Contra Costa is a nonattainment area for the state 24-hour PM10 standard.\(^8\)

These high PM10 levels have a devastating impact on Contra Costa residents: the 2002 EWG study estimated that fine particulate matter will lead to 197 deaths from long-term exposure, more than 8,500 asthma attacks, and more than 92,000 lost days of work per year.\(^9\) Table 2 lists these costs from particulate matter emissions to Contra Costa. EWG’s analysis also showed that more than 110 deaths from long-term exposure, 1,200 asthma attacks, and 10,000 lost days of work could be saved each year if the county were to achieve new state standards adopted in December 2001 (see Table 2).\(^{10}\) These standards lowered the annual average PM10 standard from 30 \(\text{ug/m}^3\) to 20 \(\text{ug/m}^3\) and created an annual average PM2.5 standard of 12 \(\text{ug/m}^3\) (in addition to the federal standard of 15 \(\text{ug/m}^3\)).
Table 2: Predicted Annual Consequences of PM Exposure, Contra Costa County

<table>
<thead>
<tr>
<th>Impact of current PM levels</th>
<th>Deaths due to long-term exposure to PM2.5</th>
<th>Deaths due to short-term exposure to PM10</th>
<th>Asthma hospital admissions due to PM10</th>
<th>Asthma emergency room visits due to PM10</th>
<th>Asthma attacks due to PM10</th>
<th>Work days lost due to PM10</th>
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<tr>
<td>197</td>
<td>63</td>
<td>23</td>
<td>58</td>
<td>8507</td>
<td>92,286</td>
<td></td>
</tr>
<tr>
<td>Reduction in impact if adopted State Standards were achieved</td>
<td>111</td>
<td>9</td>
<td>3</td>
<td>8</td>
<td>1223</td>
<td>10,349</td>
</tr>
</tbody>
</table>

Source: EWG 2002, from ARB/OEHHA 2001

Sources of Particulates in Contra Costa

The most significant single source of PM10 in Contra Costa is road dust kicked up by vehicle travel. According to ARB, in 2001, road dust emissions accounted for 39% of all PM10 emissions in the County, more than emissions from either stationary sources or from the tailpipes of vehicles. In fact, road dust made up 89% of all PM10 emissions caused by on-road mobile sources in 2001 (see Figure 2). Tailpipe emissions from light-duty vehicles are the second largest source of PM10 emissions from motor vehicles, at approximately 7%, with heavy-duty truck tailpipe emissions composing another 3%.11

Despite their small contribution to total particulate emissions, tailpipe emissions are important because they largely consist of fine particles (PM2.5), the most harmful subset of PM-10.12 While constituting a minority of the total on-road mobile source particulate matter emissions in Contra Costa, tailpipe emissions still represent a significant health threat.

Figure 2: Contra Costa County PM10 On-Road Mobile Source Emissions, 2001

*GVWR: Gross Vehicle Weight Rating  Source: ARB


**Trends in Particulate Emissions**

Despite the fact that total PM10 emissions actually declined by just over 1% between 1990 and 2001, PM10 emissions from on-road mobile sources increased by 17%, or 1.4% annually, from 10.6 tons per day in 1990 to 12.4 tons per day in 2001. Moreover, ARB forecasts this increase to continue over the next twenty years at a slightly higher annual rate of 1.5%.13

Within the on-road mobile source category, divergent trends in PM10 emissions have been recorded and forecasted for different sources. Since 1975, PM10 emissions in Contra Costa from road dust have nearly doubled, increasing at an annual rate of 2.6%. In addition, ARB forecasts that PM10 emissions from road dust will continue to increase 1.6% each year through at least 2020. Changes in engine technology cannot slow this trend, as reentrained road dust is primarily a function of the number of miles traveled by vehicles.

Tailpipe emissions from light-duty vehicles have followed a similar trend. Since 1975, tailpipe PM10 emissions from light-duty vehicles have grown nearly 50% and ARB projects these emissions to continue increasing through 2020. Although they constitute less than 10% of total PM10 emissions in Contra Costa, the increase in tailpipe emissions, both in absolute and percentage terms, is still a cause for concern due to their contribution to PM2.5 levels.

Tailpipe emissions from heavy-duty vehicles, on the other hand, are declining. After more than tripling between 1975 and 1990, this trend reversed in 1990 largely due to technological improvements and state and federal regulations. Emissions in 2001 were less than half the 1990 levels, and ARB forecasts this decline in tailpipe emissions from heavy-duty vehicles to continue into the future. Unfortunately, this positive prediction depends on the successful and widespread adoption of emission controls by engine manufacturers, who have opposed these changes.

Both road dust and tailpipe emissions of particulate matter pose a dangerous health threat to Contra Costa. Reentrained road dust is the largest single source of PM10 emissions in the county and – importantly – are unaffected by improvements in engine and fuel technology. Tailpipe
emissions of particulate matter from light-duty vehicles contain a large fraction of the dangerous fine particles and are continuing to rise. The ongoing rise in both tailpipe and road dust emissions correlates closely with the rise in vehicle travel in the county: average daily VMT in the county rose by 18% from 1990 to 2000, while road dust PM10 and light-duty tailpipe PM10 grew by 19% and 17%, respectively, during the same time period. Advances in vehicle technology are unlikely to reverse this trend. Rather, reducing one of the primary contributor’s to PM10 levels, that is, motor vehicle travel, is the only strategy that could succeed in significantly reducing particulate emissions from on-road mobile sources.

**AIR TOXICS**

Three toxic air pollutants – diesel particulate matter (diesel PM), benzene, and 1,3-butadiene – are the top contributors to cancer risk in California, with diesel PM by far the most dangerous. Motor vehicle travel is a primary contributor to the emissions of each of these three major toxics. In the San Francisco Bay Area air basin, according to 2001 data from ARB, a quarter of all diesel PM emissions come from on-road diesel vehicles, with the remaining emissions coming almost entirely from other mobile sources such as construction, industrial, and agricultural equipment. In addition, gasoline vehicles contribute 72% of total benzene emissions and 63% of total 1,3-butadiene emissions.

**Air Toxics and Public Health**

Toxic air emissions are among some of the most dangerous contributors to the health risk from air pollution. Diesel PM presents one of the most important health concerns of any toxic air pollutant. Formed by the incomplete combustion of diesel fuel in internal combustion engines, these small particles are composed of elemental carbon and ash and bond with various organic compounds and other air toxics. The danger in diesel PM lies in the fact that, like the particulate matter emitted from the tailpipes of gasoline vehicles, nearly all of it falls into the PM2.5 category (with 50-90% of the total number of particles belonged to the ultra-fine particle size range of less than 0.1 microns). This means that diesel particles have a greater likelihood of being inhaled deeper into the lung and respiratory tract, increasing the potential damage to lung cells. Moreover, the composition of diesel PM, with large quantities of ultrafine ash, organic carbon, organic compounds, and sulphates, means that these compounds are carried deep into the lower respiratory tract where they can then enter the bloodstream. In addition, per unit mass of fuel burned, heavy-duty diesel trucks emit about 25 times more PM2.5 mass compared to light-duty vehicles. According to ARB, diesel PM contributes over 70% of the known statewide risk from air toxics today.

Benzene is a clear, colorless liquid with a sickly, sweet odor, and is a component of ROG. Benzene can depress the central nervous system and increase incidences of leukemia. It is also a cancer-causing compound, or carcinogen. 1,3-butadiene, a flammable and colorless gas with a gasoline-like odor that primarily results from the incomplete combustion of gasoline and diesel fuels, also has carcinogenic properties in addition to its potential neurological effects, including blurred vision, fatigue, headache, and vertigo.

These toxic risks translate into very real health impacts upon communities. The Bay Area Air Quality Management District (BAAQMD) estimates that the average lifetime cancer risk in the Bay Area associated with exposure to diesel PM for 2001 was about 440 in one million. In that same study of selected air toxics, benzene and 1,3-butadiene were found to contribute to nearly
60% of the lifetime cancer risk from air toxics in the Bay Area.\textsuperscript{20} ARB estimates that during the 1990’s, benzene concentrations caused nearly 100 annual excess cases of cancer for Concord, while 1,3-butadiene caused an estimated 86 excess cases per year. In Richmond, the impact was even higher, where concentrations of benzene and 1,3-butadiene were estimated to have resulted in 144 and 112 excess cancer cases per year, respectively, between 1991 and 1996.\textsuperscript{21} With gasoline and diesel vehicles contributing to more than 70% of benzene and 60% of 1,3-butadiene emissions, and about 25% of diesel PM emissions, it is clear that growing vehicle travel is having a significant impact on people’s health.

But regulations and enforcement can make a difference. With the adoption of airborne toxic control measures, tighter motor vehicle standards, and especially requirements for cleaner burning fuels, the statewide levels of benzene, 1,3-butadiene, and diesel PM have fallen by 65, 45, and 40%, respectively, since 1990. Many of these reductions have come in conjunction with efforts to reduce other pollutants, such as ozone precursors, from motor vehicle emissions.\textsuperscript{22}

More improvements are still possible. ARB predicts that benzene levels will be reduced to levels below the state standard as a result of efforts to phase out MTBE from gasoline. In addition, ARB’s Diesel-Risk Reduction Plan targets a 75% reduction in diesel PM by 2010 by establishing new and more stringent emission standards for new diesel-fueled engines and vehicles, promoting technologies such as particulate traps and advanced diesel PM controls, and exploring alternatives to diesel-fueled engines altogether.\textsuperscript{23} While these technological and legislative initiatives should continue to decrease the rate at which toxic pollutants are emitted per vehicle mile, the rising level of vehicle travel in Contra Costa threatens to offset or even overwhelm the impact of technological improvements. Further, these improvements depend on the successful and widespread adoption of emission controls by engine manufacturers, who have often opposed them.

GROUND-LEVEL OZONE, OR “SMOG”

The pollutant ozone is not emitted directly, but is instead a highly reactive gas produced by a series of chemical reactions of oxygen with “ozone precursors” nitrogen oxides (NOx) and reactive organic gases (ROG) and the energy of sunlight. Distinct from the stratospheric ozone layer, which is located approximately 20 to 30 kilometers above the earth’s surface, ground level ozone leads to the formation of “smog.” Hot summer days with strong sunlight and light wind conditions tend to result in high ground-level ozone concentrations. Because ozone is created through this atmospheric reaction, emissions of ozone precursors can affect ozone levels many miles away from the emission source. Efforts to reduce ozone levels therefore require emission reductions throughout the region.

Ozone and Public Health

Ozone damages the respiratory system by causing inflammation and irritation, which often results in symptoms such as coughing, chest tightness, shortness of breath, and worsening of asthma symptoms. In sufficient doses, ozone can also make the lungs more susceptible to infection from toxins and microorganisms. Children, people with existing respiratory diseases such as asthma, and those who exercise, work, or are particularly exposed to conditions outdoors are especially sensitive. Long-term exposure to high ozone concentrations can permanently damage lung tissue.
The American Lung Association and various other institutions have conducted several studies that document the effects of ozone exposure on lung function. For example, researchers from Columbia University and New York University followed 72 sophomore cadets from the U.S. Military Academy during their summer training. The study found that cadets who attended training in Fort Dix, New Jersey, where high ozone concentrations (above 100 ppb) frequently occurred, experienced elevated levels of decline in lung function as well as significant increases in reports of cough, chest tightness, and sore throat. Another study of over 500 non-smoking Yale college students found that living for four or more years in regions of the country with high levels of ozone and related co-pollutants is associated with diminished lung function and more frequent reports of respiratory symptoms.

The California Children’s Health Study compared new asthma cases in 3,535 children who were followed over five years in 12 Southern California communities to determine the potential health damage caused by growing up in polluted air. One part of this study compared two groups of children from 1993 to 1998, one living in communities with low pollution levels and the other living in communities with high pollution levels. The study found that in high-ozone communities, children who participated in three or more team sports were 3.3 times more likely to become asthmatic when compared to less-active children. In addition, children who spent the most time outdoors were 1.4 times more likely than other children to become asthmatic in the high-ozone communities. By contrast, there was no such difference in low-ozone communities. These and other studies continue to demonstrate the strong correlation between asthma and pollutants such as ozone.

The impact of asthma on children is dramatic: the Centers for Disease Control and Prevention (CDC) estimates that 12.6% of children are diagnosed with asthma. The American Lung Association also estimates the annual cost of treating asthma in those less than 18 years of age at $3.2 billion, or approximately $351 per child.

**Asthma in Contra Costa**

According to a study from the Bay Area Regional Asthma Management and Prevention Initiative (RAMP), hospital discharge rates demonstrate that children and African-Americans are the most at risk for developing asthma in Contra Costa. Children had asthma hospitalization rates approximately one and one-half times that of the entire age-weighted population. Among people of all ages, African Americans in Contra Costa had the highest age-adjusted asthma hospitalization rate, at 348 discharges per 100,000 people. This rate is more than two times that for Asians and Latinos and more than four times the rate for whites. Among children, these racial differences are even more pronounced. African-American children had a hospitalization rate of 539 per 100,000, more than 2.5 times the rate among the group with the next highest rate – Latinos – and 4.5 times the corresponding rate for Whites.

**Ozone Precursors in Contra Costa**

As shown in Table 1, a large percentage of Contra Costa’s emissions of ozone precursors comes from on-road mobile sources – 36 and 37% from NOx and ROG, respectively. Light-duty vehicles compose the largest source of these emissions with trucks, buses, and other heavy-duty vehicles comprising the remainder.

The combined effect of stationary and mobile source emissions, added to the impact of warm weather, contributes to Contra Costa having some of the Bay Area’s worst one-hour peak levels
of ozone. According to ARB, from 1990 to 2000, the county has averaged more than 8 days a year in which ozone levels have exceeded the state one-hour standard of 90 parts per billion (ppb). Figure 4 presents the maximum one-hour average ozone concentrations recorded during 2001 at selected BAAQMD air quality monitoring stations. As seen in the figure, the stations in the Eastern District (Concord, Pittsburg, Bethel Island, and Livermore) exhibit some of the highest concentrations measured by BAAQMD. While the major sources of NOx and ROG may be located throughout Contra Costa (and other counties), atmospheric and heat conditions contribute to these higher readings in central and eastern Contra Costa.

Contra Costa, like the rest of the Bay Area, is currently considered a nonattainment area for both the state and national 1-hour ozone standard. At the end of smog season in 2003, the BAAQMD announced that the Bay Area had only had one violation of national 1-hour ozone standards, so it may apply for attainment status. However, a new national 8-hour standard is expected to go into effect in spring 2004, and the Bay Area is already out of attainment with that standard. Under state and federal law, nonattainment regions are required to develop plans to attain the state and federal standards for ozone and submit these plans to ARB and USEPA for approval.
Smog Trends in Contra Costa

Despite its high existing levels of NOx and ROG, Contra Costa has experienced significant reductions in these emissions in the quarter century since ARB began tracking emissions by source. From 1975 to 2001, on-road mobile emissions of NOx and ROG fell by 38% (nearly 2% per year) and 73% (5% per year), respectively. Figure 5 depicts these changes since 1975, using 1990 as a baseline, as well as the forecasts for the next twenty years.34

The decline in emissions of ozone precursors from vehicle travel has been largely due to state and federal environmental regulations and technological improvements. In the case of NOx, emissions have declined primarily because of the implementation of more stringent vehicle emission standards, the adoption of three-way catalytic technology, and the wider use of cleaner burning fuels. ROG emissions have declined largely because of California’s on-road motor vehicle emission control program, which includes the use of such technologies as improved evaporative emission control systems, computerized fuel injection, and engine management systems. In addition, increasingly stringent vehicle and fuel standards have forced automakers and oil refiners to produce cleaner products. Cars produced today are vastly cleaner than in 1975 and as newer vehicles replace older vehicles over time, emissions go down. As seen in Figure 1, ARB forecasts that ozone precursor emissions from on-road mobile sources will continue to decline substantially through 2020 by about 7% per year.35

Despite these advances in vehicle- and fuel-related technologies, ozone and its associated health effects remain a problem in Contra Costa. The whole Bay Area is a nonattainment area for ozone, and smog levels in some areas of Contra Costa are among the highest in the Bay Area. While technology is reducing the impact of vehicle emissions on ozone levels, the ongoing increase in vehicle travel makes emissions of NOx and ROG a continuing cause for concern. Should this pace persist, the growth in driving could offset much of the benefit of the emission

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**Figure 5:**
Index of On-Road Mobile Source NOx, ROG, and CO
Contra Costa County, 1975-2020
Measured 1975-2000; Predicted 2005-2020

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reductions made possible by technology improvements. Until Contra Costa has smog-free summers, we still need to clean up the air.

CARBON MONOXIDE

On-road mobile sources are responsible for a larger fraction (76%) of total carbon monoxide (CO) emissions than for any other pollutant in Contra Costa. Moreover, light-duty vehicles, including passenger cars, trucks, and motorcycles, made up 79% of mobile source emissions in 2001.\(^{36}\) Formed as a result of incomplete combustion of fuels and waste materials, CO emissions tend to be very local in nature, with concentrations dropping off dramatically as distance from the emission source, such as a road, increases. Readily absorbed through the lungs and into the blood, CO causes insufficient oxygen to reach the heart, brain, and other tissues and can lead to fatigue, headaches, confusion, and dizziness. The effect can be fatal for those with heart disease, and has also been associated with aggravation of angina pectoris and other aspects of coronary heart disease, decreased exercise tolerance in people with peripheral vascular disease and lung disease, impairment of central nervous system functions, and possible increased risk to fetuses.

While remaining a concern for health officials, CO levels have consistently fallen in Contra Costa and across California. Figure 5 shows that CO emissions from on-road mobile sources were nearly cut in half during the 1990’s. By 2020, ARB forecasts that emissions will have fallen by more than 80% from 1990 levels, although any attempt to forecast changes in emissions always involves some level of uncertainty. Monitoring data for maximum concentrations of CO measured in Contra Costa reflect these trends: on no day since 1981 has the county exceeded the state one-hour maximum CO standard of 20 parts per million (ppm). The adoption of more stringent emission standards, the trend toward cleaner vehicles, and the greater incorporation of cleaner burning fuels have all contributed to the declining trend in CO emissions. As seen in Figure 1, this trend is expected to continue through 2020. This dramatic decline in CO emissions is a success story in efforts to improve environmental and public health.

GREENHOUSE GASES

Global climate change, the primary result of emissions of greenhouse gases (GHG), is a problem that extends well beyond any county, state, or national boundaries. In the past 100 years, the average global temperature has risen one degree Fahrenheit. As a result, oceans are warming, sea levels are rising, glaciers are disappearing, and many species of plants and animals are dying off. By 2100 the Earth could warm another ten degrees, increasing floods, droughts, forest fires, and the severity and numbers of storms and disease.\(^{37}\)

In California, transportation is responsible for 58% of the greenhouse gas pollution, compared to 31% for the nation as a whole.\(^{38}\) Signed into law in 2002, California Assembly Bill 1058 requires the California Air Resources Board (ARB) to adopt regulations by January 1, 2005, that achieve the maximum feasible, cost-effective, and technologically attainable reductions of GHGs from passenger vehicles, while providing automobile manufacturers the flexibility to decide how to meet the regulation’s requirements.

Although motor vehicles are no doubt an important contributor to GHG emissions, the relationship between vehicle travel and the geographic extent of the resulting emissions is much more difficult to trace in the case of GHGs compared to that of criteria and toxic pollutants. For this reason, as this report is concerned with ultimately providing suggestions for steps that
Contra Costa could take to reduce emission levels locally, criteria and toxic pollutants will receive the primary focus, although many of these recommendations would also have the effect of reducing the county’s contribution to California’s GHG emissions.

**CONCLUSION ON AIR QUALITY ANALYSIS**

The preceding analysis demonstrates that legislative and technological approaches have helped reduce emissions of some air toxics, ozone precursors, and carbon monoxide, as well as decrease tailpipe PM10 emissions from heavy-duty vehicles. Improvements in vehicle technology are helping to clean the air in Contra Costa, but they cannot provide the whole solution.

Vehicle technology is not fixing the growing particulate matter pollution caused by driving, and it will not be able to do so. Efforts to reduce particulate emissions and their resulting health effects can only succeed by reducing vehicle travel. Nearly one-half of all PM10 emissions in Contra Costa come from the road dust kicked up by vehicle travel or from the tailpipes of light-duty vehicles, both of which continue to rise unabated. If the county is to become serious about reducing the harmful health impacts of air pollution, it must get serious about reducing the growth in driving, the primary contributor sources to Contra Costa’s elevated PM10 emission levels.

This section has traced the link between air quality in Contra Costa and the potential impacts of the county’s air pollution on public health. The next section carries the link one step further by identifying those communities within the county that face elevated pollutant concentrations and greater health risks from air pollution.
Who Bears the Burden?

Many Contra Costa residents are breathing unhealthy levels of pollutants such as particulate matter, ozone, and air toxics. Some low-income communities bear the brunt of this burden, receiving a disproportionate share of air pollution and its health impacts. This is particularly true for coarse and fine particulate matter, where communities with greater proximity to emission sources tend to have higher pollutant levels. This section identifies these communities, as well as the major emission sources located within them.

LOW-INCOME AND PEOPLE-OF-COLOR COMMUNITIES

As part of the 2001 Regional Transportation Plan (RTP) for the San Francisco Bay Area, the Metropolitan Transportation Committee (MTC) identified 42 low-income and people-of-color communities. The Contra Costa neighborhoods are portions of Richmond, San Pablo, North Richmond, Hercules, Rodeo, Martinez, Concord, Bay Point, Pittsburg, Antioch, and Brentwood. These communities are home to about 22% of Contra Costa’s total population but 63% of the county’s people-of-color and 44% of its low-income households.

THE DOUBLE BURDEN OF TRANSPORTATION-RELATED AND INDUSTRIAL POLLUTION

Each of these communities lies along at least one major roadway – I-80, I-680, State Route 4, or I-580. In addition, many of these communities are also affected by industrial pollution. Contra Costa has some of the largest stationary source polluters in the state. Three refineries – Martinez Refining Company and Ultramar’s Avon Refinery, both located in Martinez, and Chevron in Richmond – are among the state’s ten largest emitters of ozone precursors NOx and ROG. In addition, the Tosco Refining Company in Rodeo is one of California’s ten largest emitters of ROG and the Martinez Refining Company is one of the state’s largest PM10 stationary sources.

In the case of ozone precursors NOx and ROG, the impacts of these emissions are spread out on a regional level, but for carbon monoxide and particulate matter, whose dispersion characteristics and thus population health impacts are much more localized, these communities face a disproportionate level of pollution relative to other areas in the county. Toxic emissions, and the toxic effects of many organic compounds, are also particularly concentrated near major emission sources. Table 3 lists the county’s low-income and people-of-color communities, the associated major roadway sources, and the top 20 sources of air toxics in the county. The map in Figure 6 shows where the impacted communities are in relation to these major roadway and stationary sources in the county. The table and figure show that not only do all of the major stationary sources of toxic emissions in Contra Costa lie in and around these environmental justice communities, but also that each community lies near or is intersected by a major roadway.

Not surprisingly, these same communities also suffer from the health impacts of this pollution. Asthma rates, which are positively correlated with ozone and particulate matter levels, are higher in these environmental justice communities. Figure 7 shows, by ZIP code, age adjusted asthma-related hospitalization rates. The highest rates in Contra Costa occur in Richmond – 315 asthma-related discharges per 100,000 people. Elevated rates also exist in Martinez/Concord (214), San
Pablo (202), Hercules (182), Pittsburg (176), Antioch (171), and Rodeo (163). In fact, every environmental justice community in the county has an asthma rate that is higher than the county average (127 discharges per 100,000).  

<table>
<thead>
<tr>
<th>Community</th>
<th>Major Road Sources</th>
<th>Top 20 Major Stationary Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antioch</td>
<td>SR 4</td>
<td>GWF Power Systems, LP (Sites 3,4); Gaylord Container Corporation; Crown Cork &amp; Seal</td>
</tr>
<tr>
<td>Brentwood</td>
<td>SR 4</td>
<td>None</td>
</tr>
<tr>
<td>Concord</td>
<td>I-680; SR 4</td>
<td>None</td>
</tr>
<tr>
<td>Hercules</td>
<td>I-80</td>
<td>None</td>
</tr>
<tr>
<td>Martinez</td>
<td>SR 4</td>
<td>Ultramar, Inc.; Central Contra Costa Sanitary District; Martinez Refining Company; Acme Fill Corporation; American Marble</td>
</tr>
<tr>
<td>Pittsburg/Bay Point</td>
<td>SR 4</td>
<td>GWF Power Systems, LP (Sites 1,2,5); Criterion Catalysts Company, LP; Dow Chemical Company; USS-POSCO Industries</td>
</tr>
<tr>
<td>Richmond</td>
<td>I-80; I-580</td>
<td>Chevron Products Company; California Oils Corporation; MSC Pre Finish Materials, Inc.</td>
</tr>
<tr>
<td>Rodeo</td>
<td>I-80</td>
<td>Tosco Refining Company</td>
</tr>
<tr>
<td>San Pablo</td>
<td>I-80</td>
<td>Myers Container Corporation</td>
</tr>
</tbody>
</table>

Source: 1996 Toxic Inventory, ARB

This pattern – where low-income and people-of-color communities bear the brunt of both industrial and transportation-related pollution – is repeated around the country. According to a study by USEPA, 50% of African Americans and 60% of Hispanics were found to live in nonattainment areas that failed to meet national air quality standards for two or more pollutants, compared to only 33% of whites. Even greater differences were found for areas that violate the air quality standards for three and four pollutants. The health impacts from these pollution levels contribute to similar issues of environmental justice in these communities, where those least able to combat these impacts are so often obliged to unduly bear them.
Figure 6: Major Point and Line Sources and EL Communities, Contra Costa
INADEQUATE TRANSIT ACCESS TO JOBS, HEALTH CARE, AND SOCIAL SERVICES

Not only do the residents of these environmental justice communities bear a disproportionate share of the health impacts of transportation and industrial pollution, many do not receive the transportation benefits of those roadways. A significant fraction of households in these communities – 14% – do not own a car, more than three times the fraction in the remainder of the county. Richmond and Concord had the highest rate of zero-vehicle households at 17%, and all of the county’s environmental justice communities except Hercules/Rodeo had higher zero-vehicle rates than the remainder of the county. Households in these communities had a lower rate of automobile ownership in general, at 1.6 vehicles per household compared to a rate of 2.1 in the remainder of the county.

Residents of these communities are also more likely than other Contra Costa residents to use alternatives to driving alone. A similar analysis found that residents of low-income, people-of-color communities made more than 12% of their trips by foot, bicycle, or on transit. A survey of CalWORKs recipients found even more striking results: 38% of respondents reported using transit, 13% reported ride-sharing, and 13% reported walking or bicycling to work.

But Contra Costa is a tough place to get around without a car. MTC’s recent “Lifeline Transportation Network” (LTN) study documented several gaps in the county’s transit service along LTN routes, particularly during the evenings and on the weekends. The analysis also found that Contra Costa has a greater funding shortfall than any other county in the Bay Area for
lifeline transit needs – gaps between environmental justice communities and crucial destinations such as jobs, higher education, childcare, and social services. In addition, a recent study by TALC found that residents of environmental justice communities in Contra Costa had the worst access to health care of three counties studied: only 33% of residents have transit access to a community clinic, compared to 70-90% access levels in Alameda and Santa Clara Counties.

Table 4 presents the results of MTC’s transit travel time analysis for trips between selected communities and job centers. Many of the travel times workers might face are prohibitively long. It takes about two hours to travel from Pittsburg to San Ramon – a driving distance of only about 30 miles. Indeed, transit travel times of one and a half to two hours are quite common for cross-county trips.

Table 4: Transit Travel Times (Minutes) to Select Job Centers from Targeted Communities in Contra Costa, 1998

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Place of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S.F. Financial District</td>
</tr>
<tr>
<td>Richmond</td>
<td>57</td>
</tr>
<tr>
<td>North Richmond</td>
<td>n/a*</td>
</tr>
<tr>
<td>San Pablo</td>
<td>67</td>
</tr>
<tr>
<td>Martinez</td>
<td>101</td>
</tr>
<tr>
<td>West Pittsburg</td>
<td>123</td>
</tr>
<tr>
<td>Pittsburg</td>
<td>108</td>
</tr>
</tbody>
</table>

*n/a: no analysis conducted for the selected residence-work combination

Source: MTC, Environmental Justice Report, 2001 RTP

This lack of transit access is repeated throughout the county, and is one of the major factors leading to Contra Costa’s traffic increases. Indeed, while population is predicted to increase by a relatively modest 28% by 2025, the number of hours residents spend stuck in traffic is expected to grow by 140%. In large part this is because sprawl development is forcing people to spend increasing amounts of time in their cars.

HOW SPRAWL PROMOTES DRIVING

Contra Costa’s experience confirms national studies, which find that sprawling development is a primary cause of increasing vehicle travel. Sprawl is low-density development outside of existing neighborhoods, in areas where necessary supporting capital infrastructure such as schools and sidewalks do not yet exist. Sprawl can induce congestion simply due to the number of people who are encouraged to live far away from their daily activities, goods and services, and who do not have the option to make those trips without a car. According to the U.S. Department of Transportation (DOT), a large majority of the growth in driving between 1983 and 1990 was caused by factors influenced by sprawl. These factors include an increase in trip lengths (35%), a decrease in carpooling (17%), an increase in trips taken (18%), and the switch to driving from walking, bicycling, or riding mass transit (17%).

Increasing trip lengths (or the same people driving further for each trip) was cited in the USDOT study as accounting for over one-third of the increase in driving, making it the largest factor cited in the study. Contra Costa residents are familiar with this problem: the county’s residents have the longest commutes in the Bay Area – 34 minutes.
It is clear how current development patterns in Contra Costa have already made it very difficult for residents to use transit. Only 6% of the homes and 12% of the jobs in the county are located within 1/3 mile of a rail station, or 1/4 mile of a bus stop served by frequent bus service. If current development patterns continue, those already small percentages will shrink even further.52

The increase in trip lengths, the growing dependence on getting around by car, and the decrease in carpooling are all changes that have in part been created by the increasing separation of residential subdivisions from office parks, schools and stores. Suburban sprawl has left residents with no real alternative to driving, leading to the steadily growing vehicle travel that is driving the increases in transportation-related air pollution.
Chapter 1 of this report recognized that particulate matter emissions pose the a significant air quality problem to Contra Costa now and into the future, and one that will not be solved by relying on technology or more stringent vehicle emission standards alone. The majority of PM10 comes from transportation-related sources, and a growing share of particulate emissions is directly related to vehicle travel. Chapter 2 identified several communities that bear the double burden of proximity both to heavily traveled roads and to industrial polluters, and also showed higher levels of health problems – such as asthma – associated with air pollution in these communities. To reduce the public health impacts of transportation-related air pollution, especially for these environmental justice communities, the county must embrace aggressive efforts to stem the growth in driving, or “vehicle miles traveled” (VMT).

Several initiatives in the Bay Area and in Contra Costa in particular have the potential to improve air quality. A bill before the state legislature (SB916, or the “Regional Traffic Relief Plan”) would increase tolls on Bay Area bridges by $1 and direct the resulting $125 million annual revenue to a variety of mass transit improvements, including several in Contra Costa. The Contra Costa Transportation Authority (CCTA) is already making plans to ask the voters to reauthorize Measure C, the half-percent sales tax approved in 1988 that has primarily paid for widening highways and roads, as well as a short BART extension. Though Measure C does not expire until 2009, CCTA is preparing to put a new expenditure plan on the ballot in 2004 that would distribute $1.6 billion in transportation funding over 20 years. This is a once-in-a-generation opportunity for Contra Costa to choose investments that will improve air quality by expanding transportation choices, supporting smart growth, and making sure that the transportation system serves those who need it most. That’s why more than 35 community groups throughout the county supported a joint platform – Transportation for a Livable Contra Costa – of recommendations for Measure C.53

Finally, Shaping Our Future, a collaborative program launched in 2002 by all 19 cities and the County Board of Supervisors, will play a fundamental role in influencing the direction of future growth in the county. Through its multi-jurisdictional approach, Shaping Our Future aims to present a community-oriented vision for managing the county’s growth.

This chapter presents several programs, policies, and recommendations that, by encouraging people to get out of their cars and make greater use of transit, bicycle, and pedestrian opportunities, can help Contra Costa clear its air. The first group of recommendations – “Design Communities for People, Not Just for Cars” – is perhaps the most fundamental, promoting community designs that encourage alternative modes of travel and discourage automobile use. Supplementing any such design, however, must be a strategy to “Provide Viable Alternatives to Driving.” The third recommendation – “Set Transportation Prices to Reflect the True Costs of Driving” – calls for appropriate pricing to help people switch away from driving and towards transit, bicycling, and walking. The fourth group of recommendations – “Promote Cleaner Vehicles and Fuels” – looks at mitigating the harmful environmental effects when driving is the
only option. The chapter concludes with an analysis of “Local Initiatives” that the most affected communities could take to make change at the local level.

DESIGN COMMUNITIES FOR PEOPLE, NOT JUST FOR CARS

In too many parts of Contra Costa, community design forces people into cars every time they leave their house. While some centers for jobs and housing do exist in Contra Costa, many newer residential areas, particularly in the eastern part of the county, are increasingly characterized by sprawling development patterns. The result has been an environment in which it is often inconvenient or impossible to use mass transit and that is inaccessible and even hostile to pedestrians and cyclists. As too many residents are forced into their cars for nearly every trip, traffic congestion and air pollution get worse.

To improve air quality and public health, Contra Costa needs to design communities that make it easy to get things done without hopping in the car. Several land-use policies and community design characteristics can be used to achieve a vision of smart growth that facilitates getting around on foot, by bicycle, or on mass transit. The most significant of these features are a greater mix of land uses, increased density, improved transit accessibility, and pedestrian-friendly urban design, all of which are key components in the draft *Shaping Our Future* vision for Contra Costa. Many of these policies may be adopted at the local level through zoning changes or by providing incentives such as tax breaks or an accelerated permitting process to developers who engage in smart growth principles. Not only will these policies make transit a more convenient alternative to driving, they will also encourage walking and bicycling by reducing the distance and number of trips people take.

Another important step the county and cities could take is to prevent the types of growth that increases driving and pollution the most by strengthening the county Urban Limit Line and supporting city Urban Growth Boundaries. Restricting options for low-density sprawling subdivisions will not only protect the county’s quickly disappearing agricultural lands and open space, it will also serve to encourage more smart growth. At the same time, Contra Costa must increase support for affordable housing, as the area’s growing affordable housing crisis is increasingly forcing greater numbers of people to commute longer distances to their jobs from distant suburban locations. The lack of affordable housing lengthens commutes, worsens congestion, and contributes to further deterioration of air quality. Details about these policies, and others that can help the county change its development patterns, are contained in a recent report by Greenbelt Alliance, titled *Contra Costa: Smart Growth or Sprawl?*54

Encouraging smart growth, reining in sprawl, and providing more affordable housing will have significant impacts on vehicle travel. A comparison of two existing communities – Lafayette and Rockridge – shows how dramatic the impacts can be. Both communities share very similar socio-economic characteristics, but land use in Rockridge has many more smart growth characteristics than does Lafayette. As a result, residents of Rockridge were found to walk and bike five times more and use transit over twice as often as residents of Lafayette for non-work trips.55 *Shaping Our Future*’s transportation analysis demonstrates the impacts of following these policies countywide. Compared to a “business-as-usual” scenario, the *Shaping Our Future* vision would reduce driving hours by 32%, reduce congested miles of arterial streets by 33%, and increase transit trips by 14%.56
Transit-oriented development (TOD) can lead not only to social and economic benefits for the area in which it occurs, but also, through reductions in vehicle usage, to an improvement in air quality across the surrounding region.

**Recommendations**

- Create a strong Growth Management Program as part of Measure C
- Ensure that Measure C’s funding includes a Smart Growth Incentive Program that awards transportation funds to jurisdictions that plan for compact infill development with transit accessibility and pedestrian-friendly design.\(^{57}\)
- Invest in an Affordable Housing Trust Fund that supports transit-oriented and downtown-centered affordable housing and establish inclusionary zoning ordinances.
- Build mixed-use developments on large BART parking lots to provide homes, shopping, jobs, and other services close to transit and each other.
- Strengthen the county Urban Limit Line, adopt city Urban Growth Boundaries, and stop permitting sprawl development.
- Adopt “livable community” design standards for new development, change zoning to encourage smart growth with markets and restaurants under or next door to housing, and prepare Specific Plans for key areas.\(^{58}\)
- Ensure developer mitigation fees cover the full costs of needed infrastructure and services.
- Prepare local parking management plans and require local developers to do so as part of the permitting process.

**PROVIDE VIABLE ALTERNATIVES TO DRIVING**

Smart growth can set the stage for reduced auto use and air quality improvements, but Contra Costa must also seize that opportunity by providing viable alternatives to driving. It is in these efforts that the funding priorities set by programs such as Measure C and the proposed bridge toll increase are critical. The following three sections describe recommended investments in mass transit, access and safety for pedestrians and bicyclists, and ride-sharing, which can improve air quality by reducing vehicle travel.

**Make Mass Transit Convenient and Accessible**

With traffic congestion skyrocketing, Contra Costa commuters need new transit alternatives, and there are several good ways to improve transit service in all of the county’s major corridors. A comprehensive network of express buses could provide door-to-door service that picks people up in their neighborhoods, speeds past clogged traffic on existing and new carpool/bus lanes and drops off people directly at work. The county’s bus operators have proposed an integrated system in which comfortable new buses would run on 11 new routes and improve 10 existing routes, many running as frequently as BART, connecting all corners of the county to major job centers.\(^{59}\) In most corridors, increasing express bus service is one of the most cost-effective ways of shifting people away from driving.

In addition to express bus service, improvements to local bus service throughout the county can also play an important role in reducing driving and pollution. Because Contra Costa spends less than $40 per person per year on bus service – less than any other central Bay Area county –
current service operates well below service standards in many areas. Needed improvements include shuttles to BART stations, better connections between transit systems, more frequent buses, more direct routes, flexible demand-responsive service in some areas, and more evening, weekend and overnight service where appropriate. These improvements would not only clear the air by providing alternatives to driving, they would also improve the transportation alternatives available to the more than 30% of county residents who do not own or drive a car – mostly children, seniors, the disabled, and low-income families. It is important to note that even a half-full express bus results in 70-95% less particulate pollution than would be the case if those people were to drive alone.

Eastern Contra Costa, the portion of the county least well served by mass transit, would also benefit from “eBART”, a solution that will extend BART’s reach into East County, running the same hours and just as often as BART. Since it would use existing train tracks, eBART’s four new stations (ending at Brentwood) could be built sooner and more affordably than a one-station BART extension, whose cost far outstrips available funding. The project only makes sense, however, if jurisdictions surrounding each new eBART station plan for smart growth around the stations, and if the project includes adequate feeder transit service. New eBART service has the potential to simultaneously shift current commuters from driving to transit while having its stations also serve as a focus for the transit-oriented development in East County that is needed to stem sprawl.

The county is also considering other transit improvements, such as increased ferry service and more frequent trains along the Capitol Corridor that may prove to offer attractive alternatives to driving.

Additionally, in conjunction with the efforts of Commuter Assistance Programs (CAPs) such as the Contra Costa Commute Alternative Network (CC CAN), employers can also step forward to reward their employees for using transit. Some employers have set up their own on-site commuter programs that provide services such as transit benefits through programs like Commuter Check, telecommuting, bicycle racks, and relocation opportunities. For example, the Bishop Ranch Business Park in San Ramon operates a transportation center that provides tenant companies with a variety of free carpool, vanpool, and Guaranteed Ride Home Programs. Useful in relieving congestion and improving air quality, these incentives can also improve a company’s productivity as well as its employee recruitment and retention efforts. According to CC CAN, Contra Costa’s Transit Incentive Program, by providing incentives such as a $20 bus tickets and $170 one-month ACE train passes, reduced VMT by more than 16 million miles over the 2000/2001 fiscal year (FY). While this reduction represents less than one-fifth of 1% of Contra Costa’s total VMT in 2000, it still means that more than 650,000 vehicle trips and their associated air pollution impact were eliminated for the year.
**Recommendations**

- Ensure Measure C provides adequate funding for express buses on Interstates 80 and 680, State Route 4, and key arterials, as well as for eBART and local feeder buses
- Jurisdictions surrounding new eBART stations must plan for and build compact, mixed-use developments around the stations
- Pass bridge toll (SB 916), which would provide $125 million per year in funding for mass transit programs such as express buses, eBART, BART capacity improvements, night-BART, and improvements to the Capitol Corridor

**Optimize County’s HOV Network**

Ride-sharing and express buses are more likely to draw riders away from solo driving with a network of HOV lanes than with a disconnected scattering of lanes. But the right question to ask is how to best bridge those gaps. The usual answer is to spend millions of dollars to construct new bus/carpool lanes, even if the road is already eight lanes wide. This is not only enormously expensive, but also inevitably creates more traffic and air pollution by attracting drivers to the roadway as space is freed up in the mixed-flow lanes. The resulting bottlenecks at some intersections and connecting highways may become even worse.

Instead, transportation officials should consider the best approach for each gap. As part of its vision in *World Class Transit for the Bay Area*, TALC called for study of an “Optimize-A-Lane” strategy that would convert, in each direction, an existing mixed-flow lane on some of the busiest highways in the Bay Area to a bus/carpool lane during the peak commute hours. Where appropriate, the conversion of these lanes to high-occupancy toll (HOT) lanes (or “express lanes”) should also be considered. A strategy promoting bus/carpool or express lanes could not only provide a rapid travel alternative to Bay Area commuters tired with congestion, but it could also move many more people without the tremendous taxpayer-backed cost and environmental damage of constructing new lanes and thereby encouraging greater vehicle travel.

One potential location for this strategy is the fourth lane of State Route 24 through the Caldecott Tunnel. A study of this option should consider whether converting that lane to an express lane during commute hours, with the management objective of keeping the lane full but free flowing, would allow more people to travel through the corridor with less impact on air quality.

On Highway 4 in East County, CCTA’s most recent published plans call for an innovative strategy for the widening of Highway 4: the portion from Somersville Road to Highway 160 would be 3 lanes in each direction plus a reversible carpool lane in the median, resulting in 4 lanes in the commute direction at all times. Since those plans were published, some have pushed for a larger expansion of Highway 4 – to 8 or even 10 lanes. Sticking to the option with the reversible carpool lane, however, would provide an alternative to solo driving without as much traffic, and pollution, as would happen with a wider road.

On I-680, a recent CCTA study concluded that the best way to close the HOV lane gap through the 680/24 interchange in the southbound direction would be to convert a lane from mixed-flow to HOV use. For a cost of only $11.6 million, along with the construction already underway, this would create an uninterrupted carpool lane on southbound I-680 from the Benicia-Martinez Bridge all the way down to the I-580/I-680 interchange in Alameda County.
In addition, direct connections to carpool lanes, such as the drop ramp at Cutting Boulevard that provides rapid access to the El Cerrito del Norte BART station, would also benefit carpoolers, make the express bus system work more efficiently, and increase highway safety by reducing lane merges by buses and carpools. By eliminating drive-alone trips in favor of express buses and ride-sharing, these efforts could significantly reduce VMT and the air pollution from vehicle travel.

**Recommendations**
- Study converting fourth lane on State Route 24 to an express lane
- Create continuous HOV lane on southbound I-680 by converting an existing mixed-flow lane to an HOV lane through the 680/24 interchange, and study the feasibility of achieving other HOV access on I-680 and I-80 by converting an existing lane to an HOV or express lane
- Create HOV access on Highway 4 East based on plans to provide 3 mixed-flow lanes in each direction plus a reversible carpool lane.
- Ensure that Measure C funding provides for drop ramps at key locations to help express buses and carpools more easily enter and exit HOV lanes

**Provide Better Access and Safety for Pedestrians and Bicyclists**

Once a community has been designed to encourage fewer and shorter trips, walking and bicycling can serve a significant portion of residents’ travel needs. Walking and bicycling are not only the healthiest and most environmentally sound forms of transportation, but they also energize commercial and recreational areas and promote smart growth and transit use. CCTA’s Countywide Bicycle and Pedestrian Plan (CBPP) outlines several broad goals that the county as well as local jurisdictions should adopt in order to promote non-motorized travel. The CBPP recommends more than doubling on- and off-street bikeways to nearly 600 miles, developing a continuous pedestrian network, and improving safety and links to transit, at a total cost of nearly $277 million over 20 years. The Countywide Bicycle Project, a two-year project developed in order to provide more bicycle infrastructure through Contra Costa, has already installed more than 200 racks and lockers. Each walking and bicycle trip represents a 100% reduction in VMT for that trip, as well as the complete elimination of the air pollution impact that would have otherwise occurred.

**Recommendations**
- Ensure the CBPP is fully funded and implemented, including funding through the new Measure C and the Safe Routes to Transit program in the bridge toll bill.

**Encourage Ride-Sharing**

There are several types of ride-sharing. Some programs help interested car and vanpool partners find each other while also providing several financial incentives for them to do so. For example, RIDES for Bay Area Commuters provides free carpool-to-BART parking permits, the refund of ownership costs for use of a personal van, and commuter incentives including Commuter Check. In Contra Costa, CC CAN administers several carpool and vanpool incentive programs, including SMARTPool, a program for workers with a daily commute between 30 and 60 round trip miles that provides $250 towards the vanpool lease payment for the first six months or 50% off the vanpool fare for passengers for the first three months. CC CAN also offers a Guaranteed Ride Home program to all its rideshare participants in case of family emergency, unscheduled
overtime, or vehicle breakdown. These rideshare programs, given the proper incentives for commuters to use them and shift from simple casual carpooling, can be an effective way to reduce vehicle travel during peak periods when emission levels are often the highest. According to CC CAN’s Annual Report, the Contra Costa Countywide Carpool Program and Vanpool Incentive Program have, over the FY 2000/2001, together reduced VMT by nearly 65 million miles, or three-quarters of 1% of the County’s total VMT in 2000.

In addition, very few schools in Contra Costa offer school bus service for the general student population, leading to large amounts of traffic congestion around schools throughout the County. Administered by CC CAN staff, the SchoolPool carpool ridematching program promotes carpooling for children in all public and private schools in Contra Costa (kindergarten through college) by assembling lists of parents from each school who have expressed an interest in finding others with whom to carpool. If carpooling isn’t practical in some situations, CC CAN also offers 20 free public bus tickets to parents for each of their students to try transit. In FY 2000/2001, the SchoolPool program encouraged more than a thousand children to join carpools and resulted in an estimated reduction of 4,711 vehicle trips per day. Each vehicle trip eliminated represents a decrease in both that vehicle’s mileage and its impact on air quality.

Recommendations

- Ensure continued funding for successful CC CAN programs such as the Carpool and Vanpool Programs, the SMARTPool and SchoolPool Programs, and Countywide Guaranteed Ride Home

SET TRANSPORTATION PRICES TO REFLECT THE TRUE COSTS OF DRIVING

Various pricing mechanisms have been proposed that would make drivers more responsible for the full costs their travel choices impose on society, such as the health impacts of air pollution. These costs are estimated to be on the order of $600-$770 billion per year for the entire United States, or more than $2,000 per person. The intent of these transportation control measures (TCMs) is to encourage drivers to change their travel patterns by shifting to a different mode of transport or higher occupancy vehicles, thereby reducing vehicle travel and improving air quality. The revenue generated from such TCMs can also go to support walking, bicycling, and transit alternatives to driving. The following TCMs are the most relevant for Contra Costa:

- **Gasoline Taxes, Bridge Tolls, and Vehicle Registration fees:** Transportation user-fees make the most direct connection between the people using the Bay Area’s roads and the operation, maintenance, and improvement of the region’s transportation system. Widespread support for the proposed one-dollar hike in Bay Area bridge tolls to pay for transit improvements demonstrates that increases in user fees are politically feasible. MTC has the authority to place a regional gas tax of up to ten cents per gallon on a future ballot, although polls show voters are not likely to pass a tax greater than 5 cents.

- **Developer impact fees for Air Quality:** Sprawling new developments pollute the air by increasing commuter trips and diesel truck traffic. The San Joaquin Valley air district has just announced that they will develop a so-called “indirect source fee” to fund programs that offset the effects of that increased air pollution. By setting the fee at different levels based on how much new traffic the development will create, these fees can encourage smart growth and reduce driving as well as generate money to fund programs that clean the air. BAAQMD has the authority to impose such a fee and is considering doing so.
- **Employee Parking Cash Out**: This mechanism rewards people who choose not to drive by providing them a refund for the “free” or subsidized parking space that they choose to not use. With many work sites running out of parking space as employers fit more people into existing office buildings, a parking cash-out program can not only decrease the need for parking, thus eliminating the need and cost to employers of leasing or building additional spaces, but also encourage transit ridership since most or all of the cash out comes as a tax-free benefit to both the employer and employee.

- **Parking Charges** are another way to encourage the use of alternative forms of transportation. A parking fee would be either a set amount or variable amount accounting for peak times charged to motorists who use the parking facility. An example of this effort came in 2002, when BART considered a “Smart Parking” proposal, supported by environmental groups, to institute a daily parking charge as a way to avoid fare increases and service cuts. Although BART only adopted a “reserved parking” plan for its core system, the agency did adopt the “Smart Parking” proposal for daily parking charges at new stations in San Mateo County.

Pricing mechanisms must be designed to address the potential negative impacts on low-income families. The most common concern is that low-income drivers would not be able to afford the additional costs and would lose access to jobs or services. In assessing the relative impact on low-income families, the overall effect of a user-based fee should be assessed with consideration of how the revenue is spent. For example, one study of higher rush hour tolls on the Bay Bridge found that the average income of drivers during the peak period was over $70,000. In this case, using higher tolls to support additional Transbay transit service will, on balance, help lower-income individuals.

By encouraging alternatives to driving alone, especially during the peak hours, pricing mechanisms can be a key component of a strategy to decrease VMT and improve air quality.

**Recommendations**

- Pass SB916, which would raise tolls on state-owned bridges in the Bay Area by $1 and allocate the revenues to improvements in mass transit
- Support a regional gas tax (up to 10 cents per gallon) for cost-effective transit tied to Smart Growth land use policies and local streets/road repair
- BAAQMD should adopt an “indirect source fee” to fund programs that offset the air pollution impacts caused by new development; the fee should vary based on how much new traffic the development will create
- BART should adopt a parking charge on lots that are regularly full, to avoid the need for future fare increases and/or to provide new service and should gradually convert all spaces to paid parking or eliminate them if no one will pay the cost
- Encourage parking cash-out programs

**PROMOTE CLEANER VEHICLES AND FUELS**

When driving is the only option, strategies that focus on cleaner vehicles and fuels may reduce some of the harmful environmental effects of auto use. While such programs may potentially offer a promising, often technology-driven option to deal with the problem of vehicles and air quality, the case of particulate matter pollution demonstrates that cleaner vehicles and fuels cannot be the sole element of an emissions-reduction strategy. As described in Chapter 1, only 11% of on-road mobile source PM10 emissions are actually emitted from the vehicle tailpipe.
The other 89% comes from road dust kicked up by vehicle travel, where technology can have very little impact. Giving people choices to opt out of driving entirely is the only way to significantly reduce the harmful public health and environmental effects of vehicle travel.

Most efforts to promote cleaner vehicles and fuels are carried out at the federal and state levels; however, cities, transit agencies, and other owners of large vehicle fleets do have some opportunities to make a significant impact on air quality in their communities. Efforts by local agencies are especially important due to the fact that the pollution impacts of their vehicles – and potential reductions – occur at the most local level. Cities, the county, and other public and private organizations with a significant number of vehicles in their fleet should strongly consider the following recommendations of the “Green Fleets Program” sponsored by the International Council for Local Environmental Initiatives:

- **Optimize Vehicle Use:** The manner in which fleet vehicles are used for travel is a key determinant of the fleet’s overall efficiency. Most importantly, schedule travel efficiently so that multiple tasks can be accomplished with one trip. With proper planning, staff can often share vehicles. For shorter trips as well as for police patrols, providing bicycles can also offer substantial advantages, including emission reductions. Finally, agencies can take the simple but important steps of ensuring vehicles are regularly maintained and that employees receive proper driver training.

- **Consider Alternative Fuels and Technologies:** Larger vehicles will still be needed for many tasks such as garbage collection, school busing, and construction. Because fuel efficiency gains are more difficult with medium- and heavy-duty vehicles, they are good candidates for the use of alternative fuels. Clean fuels such as electricity, ethanol, methanol, natural gas, propane, and reformulated gasoline result in as much as 90% lower toxic pollutant and ozone-forming hydrocarbon emissions compared to conventional gasoline. The hydrocarbons formed are also less toxic and less reactive, meaning that they are slower to form ozone. Alternative technologies, including gas/electric hybrids, fuel cells, biodiesel, and electric vehicles, which make use of these fuels, should be considered depending on specific needs and availabilities.

- **Provide Support Infrastructure:** Various measures can be taken to encourage and support residents using cleaner vehicles and fuels. Improving access to filling stations, providing preferential parking for electric vehicle charging, and helping with the conversion process are all measures that cities and counties can take.

Transit agencies operating in Contra Costa have recently received over $8 million from the Congestion Mitigation and Air Quality (CMAQ) program and local matches to help finance the purchase of emission-control retrofit devices for diesel buses. These devices, known as Claire-Longview emission control systems, will replace mufflers from model year 1994 and later and have been verified to reduce tailpipe emissions of particulate matter by 85% and oxides of nitrogen by 25%. Other agencies with significant diesel fleets, such as school bus operators and sanitation districts, may be able to achieve similar pollution reductions from these or similar retrofit devices.

As was mentioned above, most initiatives promoting cleaner vehicles and fuels are done at the federal and state levels. ARB has been a national leader in the research and development of Zero Emission Vehicles (ZEVs) and near-zero emission vehicles. The state’s Zero Emission Vehicle Inventive Program, signed into law (AB 2061) on September 30, 2000, provides rebates of as
much as $9,000 over three years for the purchase of freeway-capable electric vehicles. Guidelines for additional single installment ZEV grants of $5,000 were also approved by ARB in 2002. Another legislative action, Assembly Bill 2076, passed in 2000, directs the California Energy Commission and the Air Resources Board to develop and adopt recommendations for the Governor and the Legislature on a California strategy to reduce petroleum dependence. ARB’s resulting report, *Reducing California’s Petroleum Dependence*, proposes measures such as a 15% reduction in on-road gasoline and diesel demand by 2020, a doubling of the national fuel economy standards for new vehicles to a fleet average of 40 miles per gallon by 2020, and an increase in the use of alternative fuels to 20% of on-road fuel consumption by 2020 and 30% by 2030. To achieve these recommendations, the report suggests increasing transportation energy efficiency as well as the use of non-petroleum fuels and advanced transportation technologies including alternative fuel, hybrid, and high-fuel efficiency vehicles. ARB’s recommendations support many of the suggestions made throughout this report that would reduce VMT and the air pollution impact from vehicle travel.

**Recommendations**

- Transit agencies should prioritize installing the new Claire Longview emission-control system on buses that serve EJ communities
- Cities, the County, and other large fleet operators should join ICLEI’s Green Fleets Program
- Continue to support California’s efforts to purchase alternative fuel vehicles through programs such as the Zero Emission Vehicle Incentive Program
- Implement the recommendations of ARB’s *Reducing California’s Petroleum Dependence* report, pursuant to Assembly Bill 2076

**LOCAL INITIATIVES IN ENVIRONMENTAL JUSTICE COMMUNITIES**

This final section includes recommendations specific to the individual environmental justice communities identified in this report: portions of Richmond, San Pablo, North Richmond, Hercules, Rodeo, Martinez, Concord, Bay Point, Pittsburg, Antioch, and Brentwood.

**Adopt Specific Plans for Transit Villages**

The planning process used for the Pleasant Hill Transit Village provides a model for how agencies can cooperate to develop a Specific Plan for a key site. The Pleasant Hill transit village covers 140 acres and surrounds the Pleasant Hill BART station. Built in the early 1970’s, the station is now strategically located where BART, I-680, a major sub-regional arterial, and a regional trail all converge. Based on extensive community input, a Specific Plan was developed that includes a regional approach to addressing development and traffic concerns, the creation of a jobs/housing balance around existing transportation facilities, public/private financing of infrastructure improvements, requirements for a TDM plan and child care programs, and public financing of affordable housing projects through redevelopment tax increments and tax exempt bonds.

Contra Costa has several other opportunities to emulate this type of transit-oriented development. The BART stations of Pittsburg/Bay Point, Concord, and Richmond, as well as the Martinez Intermodal facility, the San Pablo Rapid Bus corridor, and proposed future eBART stations are all within or close to environmental justice communities. Each deserves a Specific Plan to...
develop community consensus on specific types of development while also reflecting broader regional needs. Cities and the county can use these Specific Plans to shape and attract new development, with the potential to combine air quality improvements with community-based economic development their residents sorely need.

**Recommendations**

- Prepare Specific Plans for transit-oriented developments within or close to environmental justice communities, such as at Pittsburg/Bay Point BART, Concord BART, North Concord BART, Martinez Intermodal, San Pablo Avenue Rapid Bus corridor, and proposed eBART stations.

**Manage Truck Traffic to Reduce Air Pollution**

Many of Contra Costa’s environmental justice communities have large industrial facilities with significant levels of truck traffic. Pollutants from diesel trucks are among some of the most dangerous contributors to elevated asthma and cancer rates in these communities. The experience of West Oakland, which has more than 10,000 trucks pass through its borders each day, provides a guide for Contra Costa’s communities. With truck traffic, the high concentration of brownfields, lead contamination, illegal dumping, and industrial activity, West Oakland residents face five times the exposure levels of toxic chemicals per capita compared to their neighbors in the remainder of Oakland. Strategies to reduce the harmful effects of this truck traffic include installing particulate filters, making greater use of rail facilities to replace truck trips, and using technology to better coordinate truck traffic such that less time is spent idling, fewer trips with empty containers are made, and truck congestion is reduced. Contra Costa’s environmental justice communities could reduce their pollution burden by adopting some of these recommendations or forcing their industrial tenants to do so.

**Recommendations**

- Seek to reduce the harmful air pollution impacts of truck traffic by using cleaner vehicle technology, replacing truck trips with rail trips, limiting idling, and improving the efficiency of fleet operation.

**Target Contra Costa Clean Fuel Vehicle Project to Environmental Justice Communities**

In the nine environmental justice communities identified above, there are more than 100 diesel and 1,000 gasoline vehicles in city fleets. This count does not include school buses and garbage trucks, many of whose pollution impacts could be reduced by a diesel retrofit or by conversion to alternative fuel. And yet the Contra Costa Clean Fuel Vehicle Project – a countywide effort to convert public vehicle fleets to alternative clean fuel – has only resulted in the replacement of 50 gasoline-powered vehicles and 14 school buses with CNG. And while most of the buses used by the higher-income Lamorinda School Bus program are CNG buses, inadequate school bus funding means that many other districts use diesel buses, if they have school buses at all. Contra Costa’s environmental justice communities need a more aggressive investment in clean fuel vehicles.

**Recommendations**

- Increase funding for the Contra Costa Clean Fuel Vehicle Project, and target investments to allow environmental justice communities to purchase and convert to alternative fuel vehicles and retrofit old diesel engines.
Conclusion

Contra Costa’s growth patterns and transportation network are contributing to increasing levels of air pollution and health risks to residents. The county has also failed to focus on stemming the growth in vehicle travel. As a result, a self-defeating spiral of low-density suburban sprawl and highway expansions have left many residents of Contra Costa almost entirely dependent on their automobiles for mobility. The resulting congestion along major roadways such as Interstate 80 and State Route 4 has meant that communities living along these corridors have been particularly exposed to the pollution from vehicle emissions.

But now Contra Costa has a chance to reverse these trends. Measure C is up for reauthorization, the *Shaping Our Future* process offers hope for new regional cooperation, and initiatives at the regional and state levels offer new opportunities. Contra Costa must choose investments and policies that will expand transportation choices, rein in sprawl, and reduce the harmful environmental and health effects of automobile emissions of toxic pollutants, ozone precursors, and particulate matter. In addition to improving the health of certain low-income and person-of-color communities in high-pollutant areas, these investments could also increase their mobility options, giving them greater access to jobs, health care, education, and many other services. By designing communities for people and not just for cars, providing viable alternatives to driving, setting transportation prices to reflect the true costs of driving, and promoting cleaner vehicles and fuels, Contra Costa residents could stop choking on sprawl and breathe a little easier.
Notes

3 According to the 2002 Almanac, the ARB breaks down emissions into the following source categories: stationary, area-wide, natural, and mobile sources. Stationary sources have a fixed location and are usually industrial or commercial enterprises. Examples include power plants, factories, colleges, and gasoline stations. Area-wide source emissions consist of point sources that are not practical to track individually, such as homes and small office buildings, and non-point miscellaneous sources such as farming operations and residential fuel combustion. Natural sources, which include wildfires and windblown dust, are responsible for very little of any of the listed criteria or toxic pollutant emissions, and therefore are not included in Table 1. Mobile sources include both on-road vehicles (such as cars, trucks and buses) and off-road equipment (such as ships, airplanes, agricultural and construction equipment). Two of the sources classified by ARB as “miscellaneous area-wide sources” – paved and unpaved road dust – are actually caused by on-road vehicle travel, by the simple movement of vehicles along roadways. Table 1 includes these transportation-related dust emissions along with tailpipe emissions in the analysis of total “On-Road Mobile Sources”.
7 Figure 1 includes only some of BAAQMD’s monitoring stations: the figure includes all stations in the Eastern District; for all other districts, the figure includes the stations with the highest and lowest maximum concentrations recorded.
8 Regions have not yet been designated by USEPA for the new PM2.5 standard. The only air quality monitoring station in Contra Costa that measured PM2.5 is located in Concord. Its 2000 measurement for PM2.5 of the maximum 24-hour average concentration of 53 μg/m³ is just under the federal and state standard of 65 μg/m³.
10 Scientists at the Air Resources Board (ARB) and Office of Environmental Health Hazard Assessment (OEHHA) proposed new regulations that were adopted in December 2001 lowering the annual average PM10 standard from 30 to 20 μg/m³ and creating a PM2.5 annual average standard of 12 μg/m³. While these standards have been adopted, they have not been achieved in Contra Costa.
30 Figure 4 includes only some of BAAQMD’s monitoring stations: the figure includes all stations in the Eastern District; for all other districts, the figure includes the stations with the highest and lowest maximum concentrations recorded.
33 A district with a nonattainment designation is also authorized to levy a fee on motor vehicles registered in the district. As such, vehicles registered in all nine Bay Area counties are assessed a four dollar fee, which is collected by the Department of Motor Vehicles and then transmitted to the air quality management district. In the case of the Bay Area, BAAQMD distributes money collected from these fees (approximately $20 million per year) through its Transportation Fund for Clean Air (TFCA).
35 These standards and technologies are forecast by ARB to reduce NOx emissions for all types of vehicles. However, ARB’s prediction for heavy-duty diesel vehicles, which compose more than a quarter of NOx emissions from mobile sources in Contra Costa, may be overly optimistic. Between 2001 and 2020, ARB forecasts heavy-duty diesel vehicle NOx emissions to decrease by almost 80%, largely due to the significant reductions expected from a 1998 settlement between USEPA and the trucking industry calling for engine makers to spend more than $850 million to develop cleaner-burning engines and rebuild and replace older engines. Due to an underestimation of the life expectancy of the older highly polluting engines, however, these reductions may be delayed by more than a decade and at least two-thirds of the NOx reductions projected from rebuilt engines will not occur for an additional 12 to 24 years. See http://www.eenews.net/Greenwire/Backissues/071603/071603gw.htm#7.
39 Metropolitan Transportation Commission. Environmental Justice Report for the 2001 Regional Transportation Plan for the San Francisco Bay Area, September 2001. MTC’s identified as “communities of concern” those areas whose population was at least 70% minority (African American, Asian American, Hispanic, or Native American) or at least 30% low-income (defined as having a household income at or below 200% of the federal poverty line). The analysis used the 2000 Census for race, but the 1990 census for household income, as income data was not yet available for the 2000 Census. Percentages of total population and low-income households belonging to the selected
communities were taken from MTC’s analysis and represent data from 1998. Percentage of people-of-color population belonging to the selected communities was determined using 2000 Census data by block group.


41 Air Resources Board, 1996 Toxic Inventory.

42 Such correlation does not necessarily indicate causation. There are many other factors that contribute to the development of asthma symptoms.


45 Transportation and Land Use Coalition (TALC), Roadblocks to Health: Transportation Barriers to Healthy Communities. 2002. Available at www.transcoalition.org/reports/rb/rb_home.html

46 Data from Contra Costa Employment and Human Services Department, cited in CCTA, Countywide Bicycle and Pedestrian Plan, December 2002, p.25.

47 Metropolitan Transportation Commission, Lifeline Transportation Network: 2001 Regional Transportation Plan for the San Francisco Bay Area, December 2001. Data on comparative need by county provided in memo from Connie Soper, MTC, to Jeff Hobson, TALC, February 5, 2002. Cost estimates were developed assuming fixed route transit service, which may not be appropriate to fill all gaps in the network.

48 Transportation and Land Use Coalition (TALC), Roadblocks to Health: Transportation Barriers to Healthy Communities. 2002. Available at www.transcoalition.org/reports/rb/rb_home.html


51 Surface Transportation Policy Project, Transportation Data from the 2000 Census, June 2002. Available at www.transact.org under “Library”.


55 Cervero, Robert and Radisch, Carolyn, Transportation Choices in Pedestrian Versus Automobile Oriented Neighborhoods, (Berkeley, CA, University of California Transportation Center, University of California, Berkeley, 1995).


57 More details on Measure C’s Growth Management Program and a potential smart growth incentive program are contained in Transportation and Land Use Coalition, Transportation for a Livable Contra Costa, June 2003. Available at www.transcoalition.org/reports/tlcc/tlcc_home.html

58 Many of these land use recommendations are discussed in more detail in Greenbelt Alliance, Contra Costa: Smart Growth or Sprawl?, June 2003. Available at www.greenbelt.org/downloads/resources/report_CCLUA.pdf


61 DMV records, analyzed by Metropolitan Transportation Commission, 2000.

62 Based on express bus capacity of 40 people; many express buses carry more passengers. Road dust emissions based on assumption that entrained road dust from buses would result in no more than approximately 6 times the amount of road dust as that from a mile traveled by a passenger car (since the gross vehicle weight of an average bus is also about 6 times that of a passenger car). For tailpipe emissions, diesel and CNG buses emit about 1.3 and 1.28 as much PM10 as a passenger car (see “Emission Reduction Calculation Methodologies,” California Department of Transportation, available at http://www.dot.ca.gov/hq/transprog/reports/CMAQCAL.pdf).

63 CCTA’s original plans include 8 lanes (or 4 in each direction, with one of them a carpool lane) nearly to Somersville Road, then 6 lanes (3 in each direction) plus a reversible carpool lane from there to Hwy 160. Based on information from the original *Route 4 East Corridor Final Major Investment Study* (1999), CCTA’s *2000 Update: Contra Costa Countywide Comprehensive Transportation Plan, 2002 Strategic Plan*, and MTC’s *2001 Regional Transportation Plan for the San Francisco Bay Area*.

64 CCTA, *I-680 Investment Options Analysis: Final Report*, May 19, 2003, p.4. Southbound Main Street to Livorna ($11.7 million). The analysis notes that the three remaining mixed-flow lanes are consistent with the three southbound mixed-flow lanes at Livorna.


74 Frick, Karen T., Heminger, Steve, and Dittmar, Hank, “Bay Bridge Congestion-Pricing Project: Lessons Learned to Date”, *Transportation Research Record*, (Issue No. 1558, pp. 29-38).


77 Conversation with John Goodwin, MTC, 7/9/03. Of the four bus operators in Contra Costa, AC Transit will receive 727 devices; CCCTA County Connection will receive 89 devices; Tri-Delta Transit will receive 46 devices; and WestCAT will receive 30 devices, accounting for nearly all of the vehicles in these operators’ fleets.


82 Conversation with Tim Leong, Oakland Port Environmental Scientist in the Environmental Health and Safety Compliance Division, 7/21/03.

83 Conversations with various contacts at municipal Public Works Departments, Vehicle Maintenance Yards and Engineering Divisions, 7/9/03-7/18/03: Concord, Hercules, Martinez, Pittsburg, and Richmond.
