

## **CHAPTER 11**

---

### **TRANSPORTATION, LAND USE AND AIR QUALITY**

**Introduction**

**Land Use, Transportation and Air Quality Linkage**

**Land Use Concepts Recommended for Consideration by**

**County and City Planning Agencies**

**Transportation System Management Policies**

**and Programs**

**Sustainable Communities and Climate Protection Act of**

**2008 (Senate Bill 375)**

**VMT Reductions for Select Land Use and Transportation**

**Policies**

**Emission Reduction Potential**

## **11. TRANSPORTATION, LAND USE AND AIR QUALITY**

### **11.1 INTRODUCTION**

The Santa Barbara County Association of Governments projects the population of Santa Barbara County to increase by 15 percent to a population of 492,800 over the next 30 years. According to the Santa Barbara County Planning and Development Department, Santa Barbara County will also face tremendous pressure for growth and for land on which to build. The increase in population and the land use decisions made to accommodate the anticipated growth could significantly affect transportation patterns, including trip generation, trip length and mode choice, and changes in these areas could affect air quality.

This chapter discusses the connection between land use development, transportation and air quality and introduces some ideas and concepts to minimize air pollution impacts of growth. The chapter is purely informational; its intent is not to establish land use policies or to suggest that local jurisdictions consider these concepts. Communities can and should decide which land use policies would ultimately result in the fewest negative impacts on air quality.

A comprehensive approach should be applied when considering the ideas discussed in this chapter. Applying any one element alone may lead to unintended results. For example, land use policies that increase densities with the intent of reducing vehicle trips may not succeed if adequate alternative transportation opportunities are not provided.

### **11.2 LAND USE, TRANSPORTATION, AND AIR QUALITY LINKAGE**

Motor vehicles are the largest source of human-generated onshore air pollution in Santa Barbara County. Consistent with state and national trends and as discussed in Chapter 5 of this 2010 Plan, motor vehicle use continues to increase and the number of vehicle miles traveled is increasing at a rate generally greater than the rate of population growth. Many factors contribute to this phenomenon. One principal factor is land use development design that results in an imbalance between the location of jobs and the location of housing, leading to long-distance commuting to and from work. Land use design that considers the automobile to be the primary means of transportation from housing to services and commercial centers can increase the number of associated vehicle trips. Other social and economic factors that affect the price of housing can result in demographic shifts that also affect vehicle miles traveled and the number of vehicle trips.

Within local communities, sprawling residential developments isolated from commercial areas make it very difficult to walk, bike, or use transit to meet everyday needs. According to the Federal Centers for Disease Control, urban sprawl and the increasing time spent in the private automobile may be contributing to myriad societal ills such as obesity, isolation of children and elderly and poor air quality, which has contributed significantly to harming the respiratory health of millions of children. Alternatives to reducing sprawling patterns include:

- Promoting a balance of jobs and housing in the community.

- Strengthening existing communities by directing development towards infill locations.
- Taking advantage of compact and green building designs.
- Preserving open space and agricultural land.
- Providing a variety of housing opportunities and choices.
- Avoiding locating new residential and other sensitive land uses near freeways and other high traffic roadways.
- Creating walkable communities with a variety of transportation choices.

An effective neighborhood design would establish a mixed-use community within a typical 2,000-foot walking distance of a transit stop and core commercial area. The design, configuration, and mix of uses would emphasize a pedestrian-oriented environment and would reinforce the use of alternative modes of transportation while not excluding the use of the automobile. By creating opportunities to utilize transit and to walk and bike, effective neighborhood design can reduce the number of auto trips and vehicle miles traveled - benefitting air quality and enhancing the area's quality of life

The APCD encourages local governments to adopt planning and design concepts that help communities to minimize their impacts on air quality and maximize the use of less polluting designs and technologies. Strategies that focus on reducing vehicle miles traveled, vehicle trips and peak hour travel, will reduce emissions of particulate matter, carbon monoxide and nitrogen oxides, reactive organic compounds and ground level ozone, the primary air pollutants of concern on a regional scale for most land use projects.

### **11.3 LAND USE CONCEPTS FOR CONSIDERATION BY COUNTY AND CITY PLANNING AGENCIES**

Land use policies can be designed to reduce dependence on the private auto and to enhance the viability of alternate forms of transportation. Active measures that allow a choice of transportation alternatives such as buses, bicycles and walking should be considered. It is not envisioned that all local jurisdictions will become uniform in considering more land intensive development policies. Communities can and should decide which ideas to accept and how to offer opportunities not currently available; local jurisdictions do not need to be uniform in how they apply these strategies.

#### **11.3.1 Appropriate Location and Density**

Contiguous development within existing urban boundaries is preferred. Urban growth boundaries delineate where development ends and open space begins. They are an effective way to reduce sprawl and preserve agriculture and environmentally sensitive resources. The preservation of open space areas within urban boundaries can also increase quality of life and reduce potential vehicle trips. At the same time, infill, redevelopment, and reuse of vacant or underused parcels within already developed areas and along existing or potential transit corridors may encourage walking and make possible higher rates of transit use because activities are

located closer together. Infill development, however, should not place residents or employees near sources of nuisance dust or odors, high traffic roadways or expose them to chronic or acute health risks or accidental releases of hazardous or toxic substances.

### ***Concepts***

- *Cities and unincorporated urban communities should incorporate appropriately located development designed to reduce the relative share of car trips and travel distances and encourage the use of alternative forms of transportation.*
- *Urban growth should occur within the urban boundary lines of cities and unincorporated communities. Rural areas and agriculturally-zoned parcels should be maintained as open space, agricultural lands and very low-density residential development.*
- *Local planning agencies should encourage walking and transit use by planning neighborhoods and commercial centers to allow for convenient access to, and use of, local and regional transit systems.*
- *Transit providers and local planning agencies should collaborate to ensure that convenient and regular transit service is available at the same time as when development occurs.*

#### **11.3.2 Mix of Land Uses**

Mixed-use neighborhoods reduce automobile use by allowing people to work, shop and play near where they live. Locating compatible land uses within walking distance of each other can result in a higher level of walking and more transit use compared to single-use projects. Development projects that provide or contribute to a diverse mix of residential, commercial and institutional land-use types and open space are desirable. However, as with infill projects, mixed-use projects should not compromise the health and safety of the public. While conventional zoning typically results in the spatial separation of different land uses, mixed use recognizes that some land uses are functionally compatible with one another and need not be physically separated.

### ***Concepts***

- *The mixing of compatible commercial and residential land uses should be encouraged when it will reduce dependence on the automobile or improve the balance between jobs and housing without creating incompatible land use relationships.*

#### **11.3.3 Balancing Jobs and Housing**

The home-to-work trip accounts for about one-quarter of all private vehicle trips in a typical urban area; in rural areas the ratio is even higher. The length and location of these trips is an important factor in determining the type of transportation alternatives available to the commuter and the quantity of air pollutants generated. If the average travel distance between the home and workplace is relatively long, private vehicle emissions increase and non-motorized travel alternatives become less viable.

Imbalances between jobs and housing result in longer travel distances between home and work and consequently, more air pollution from cars. It may not be possible to achieve a jobs-housing

balance in all communities because of their size, population characteristics or limited resources. However, it is desirable to narrow the quantitative as well as qualitative gap between jobs and housing, or at least make sure that it does not increase.

***Concept***

- *Within cities and unincorporated communities, the gap between the availability of jobs and housing should be assessed and mitigated to the greatest extent feasible through land use plan policies.*

## **11.4 TRANSPORTATION SYSTEM MANAGEMENT POLICIES AND PROGRAMS**

Providing improved accessibility for all travelers should be the primary objective in the design and construction of transportation systems that supports alternative travel modes and decrease reliance on single occupant motor vehicles.

### **11.4.1 Promoting Accessibility in the Transportation System**

Providing direct routes and ensuring some separation from vehicles for pedestrians and bicycles can result in safer environments for bicyclists and pedestrians while maintaining efficient travel times for vehicles. Adequate sidewalks and paths can increase pedestrian accessibility and afford protection from fast vehicular traffic.

***Concept***

- *Jurisdictions should adopt the concept of improved accessibility as a planning goal and as a means to coordinate land use and transportation planning efforts.*
- *Where jobs/housing imbalance is already established, explore the development of transportation alternatives that would reduced the overall number of vehicle miles traveled.*

### **11.4.2 Promoting Walking and Bicycling**

A connected network of streets is important for the design of pedestrian-scaled and bicycle-friendly residential and commercial neighborhoods. A network of sidewalks and pathways makes walking and biking routes shorter and more convenient. Wide sidewalks, trees and attractive buildings that face the street are features that encourage people to walk and bike in a neighborhood.

## **Concepts**

- *Local planning agencies should encourage walking by planning for existing and new residential and commercial areas to include a safe and interconnected street system with adequate sidewalks and/or pedestrian trails.*
- *Local planning agencies should develop pedestrian- and bicycle-friendly design standards that apply to all residential and commercial projects.*

### **11.4.3 Transportation Demand Management**

Transportation Demand Management strategies reduce single occupant vehicle trips by providing more transportation options. Jurisdictions can implement programs that encourage or require new development projects to provide facilities and amenities supporting the use of alternative transportation modes. Implementation of a structured Transportation Demand Management-based program by local jurisdictions could also partially mitigate the negative transportation and air quality impacts associated with the planned development of commercial and retail land uses<sup>1</sup>.

## **Concept**

- *Jurisdictions should support actions to reduce single occupant vehicle trips by adopting programs that encourage or require new commercial and industrial development projects to provide facilities and amenities that reduce reliance on private vehicle use and support the use of alternative transportation.*
- *Where significant jobs/housing imbalances have been identified, jurisdictions should support the establishment of efficient and convenient alternatives to single occupant vehicle commuting.*

## **11.5 Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375)**

Some of the concepts listed above could be implemented through the mandates of the Sustainable Communities and Climate Protection Act of 2008 (Senate Bill 375).

Senate Bill 375 (SB 375), passed in 2008 by the California legislature, places new regional planning responsibilities on Metropolitan Planning Organizations (MPOs). (Santa Barbara County's MPO is the Santa Barbara County Association of Governments or SBCAG). The bill is intended to help meet the state's greenhouse gas (GHG) emission reduction goals in Assembly Bill 32 by reducing emissions from car and light-duty truck travel through regional transportation and land use strategies (refer to Chapter 9 for more details on AB 32).

SB 375 ties the regional housing and transportation planning and land use planning processes together by mandating the preparation of a Sustainable Communities Strategy (SCS) in the Regional Transportation Plan. The SCS is to be prepared to show how the region will meet targeted reductions in GHG emissions. The targeted reductions will be set by the California Air Resources Board (ARB) in September 2010 and then incorporated into SBCAG's SCS in the next Regional Transportation Plan update (currently scheduled for early 2013). The bill would

---

<sup>1</sup> The Office of Traffic Solutions at SBCAG can provide more information on these measures.

require certain transportation planning and programming activities by MPOs to be consistent with the SCS contained in the regional transportation plan. A Further Study Transportation Control Measure has been included in Chapter 5 of this plan and is tied closely to the analysis and development of the SCS over the next few years.

To achieve the targeted reductions by reducing vehicle miles travelled (VMT), the SCS requirements represent a unique opportunity to align VMT reduction strategies with regional housing and transportation planning strategies through land use and related policies. For example, one component of the SCS includes analyzing the feasibility of transit priority projects that will contribute to reducing regional GHG emissions. SB 375 sets criteria for what can be considered a transit priority project, such as:

- minimum residential/commercial mixed use sizes,
- close access to major transit stops and high quality transit corridors, and
- compliance with extensive environmental and land use criteria.

The criteria for transit priority projects were written in a way to incentivize their development. California Environmental Quality Act (CEQA) exemptions (for growth-inducing impacts and project-specific and cumulative traffic impacts).

## **11.6 VMT Reductions for Select Land Use and Transportation Policies**

Considerable research has been conducted on the role of advanced vehicle and fuels technologies in reducing motor vehicle emissions. Unfortunately there is considerably less information on the potential contribution for transportation and land use strategies to reduce the amount of vehicle miles traveled. This section summarizes the finding of three recent studies on the potential effectiveness of some of the strategies discussed earlier.

### **11.6.1 Draft Policy Brief (for ARB) on the Impacts of Residential Density (Marlon Boarnet UC Irvine and Susan Handy, UC Davis. 2010)**

This paper reviews several recent studies on how increased residential density achieved through policies such as relaxing minimum lot size requirements, increasing the density of allowed development and encouraging urban infill may reduce VMT. The authors report that on average, doubling residential density could reduce VMT by about 5% to 12%. However, as the studies focus largely on urban places, little is known about how the residential density-VMT relationship might vary across urban and rural areas. The evidence on land use and travel suggests that factors other than residential density, including regional access to jobs and median family income, are more important to VMT. Residential density increases in areas with strong access to regional jobs may have more of an impact on reducing VMT than similar increases in density in places farther from job centers. On the other hand, residential density increases that produce high cost housing may attract residents that, due to their relative higher wealth, have higher than average per capita levels of single occupant vehicle trips.

### 11.6.2 Draft Policy Brief (for ARB) on the Impacts of Transit Access (distance to transit) (Gil Tal and Susan Handy, UC Davis and Marlon Boarnet, UC Davis. 2010)

This paper reviews several recent studies on the effect of that distance has on the use of public transit. It is almost axiomatic that when residents are farther from transit stations, they are less likely to use transit and more likely to drive to the station when they do. The estimated effect ranges from a 1.3% decrease to a 5.8% decrease in VMT per mile closer to a station. This effect is likely to occur only within about two miles of a rail station and 0.75 miles of a bus stop. The actual effect on VMT will depend on several factors including transit level of service, trip destinations and relative driving times. Little is known about how the effect may vary between urban and rural areas, as most of the data used in the studies are from large urban areas.

### 11.6.3 *Moving Cooler* – An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions (Cambridge Systematics, Inc. 2009)

The intent of the *Moving Cooler* study is to assess the potential effectiveness of a broad variety of transportation strategies to reduce GHG emissions. To the degree that such strategies reduce VMT (as opposed to vehicle and fuel technologies) a corresponding side benefit of reductions in criteria pollutants would also occur. The study examines the GHG emission reduction potential of an individual strategy as well as combined “bundles of strategies” and includes potential costs and the time frame in which strategies would achieve results. The study found reductions in GHG from the strategies as shown below; these strategies should also produce reductions in criteria pollutants:

- Integrated suite of land use strategies – a 0.2% to 1.2% reduction
- Pedestrian and bicycle infrastructure improvements– 0.2% to 0.5% reduction
- Transit capital improvements: up to 1.2% reduction
- Car sharing and employer based commute strategies: up to 1.7% reduction

## 11.7 Emission Reduction Potential<sup>2</sup>

A rough estimate of the emission reduction potential of a strategy can be derived by multiplying the number of VMT reduced (miles) by the emission factor for a given pollutant (grams per mile). Table 11-1 provides emission factors for the two ozone precursor pollutants, reactive organic gases (ROG) and nitrogen oxides (NOx). These composite running mode factors<sup>3</sup> were calculated using the Air Resources Board’s EMFAC model and reflect Santa Barbara County specific conditions for light-duty cars and trucks. As can be seen, the emission factors decline with time as a result of cleaner vehicles being introduced into the fleet in the future.

---

<sup>2</sup> As the strategies in this chapter primarily affect light duty vehicles and trucks (e.g., passenger vehicles) the emission reduction potentials focus on potential emission reductions from this group of motor vehicles

<sup>3</sup> ARB’s EMFAC model generates emission factors for two modes of vehicle operation: when a vehicle is started (“start mode”) and when it is in motion (“running mode”). Emissions are greater during the start mode as emissions controls are not fully functional (e.g., the catalytic converter has not warmed up).



**Table 11-1**  
**Running Mode Emission Factors for Light Duty cars and Trucks**

Pollutant	2010	2015	2020	2030
	(grams per mile)	(grams per mile)	(grams per mile)	(grams per mile)
ROC	0.36	0.21	0.15	0.09
NO <sub>x</sub>	0.44	0.29	0.20	0.10

Table 11-2 illustrates the annual emission reductions for ROC and NO<sub>x</sub> that could potentially be realized in Santa Barbara County if annual VMT were reduced by 1%, 5% and 10%.

**Table 11-2**  
**Potential Emission Reductions in Santa Barbara County (tons/yr)<sup>4</sup>**

Percent VMT reduction	2010		2015		2020		2030	
	ROC	NO <sub>x</sub>	ROC	NO <sub>x</sub>	ROC	NO <sub>x</sub>	ROC	NO <sub>x</sub>
1%	13.9	17	8.5	11.7	6.3	8.4	3.9	4.4
5%	69.5	85	42.5	58.5	31.5	42	19.5	22
10%	139	170	85	117	63	84	39	44

---

<sup>4</sup> These reductions are calculated using the running mode emissions in Table 11-1.