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EVALUATION OF *PLAN BAY AREA*

By Wendell Cox

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EXECUTIVE SUMMARY

The Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) are required to produce long-term plans relating to transportation, housing and environmental protection by law. A Draft Environmental Impact Review (DEIR) has been issued in connection with the proposed "Plan Bay Area." Plan Bay Area sets out a vision for transportation and land use over the next quarter century.

The Bay Area is one of the world's most successful metropolitan areas (labor market), having among the highest per capita incomes. At the same time, there are substantial challenges. The cost of living is high, driven by house prices that are the highest in the nation. The Bay Area has some of the most intense traffic congestion in the nation, which retards economic growth. Since 2000, there has been a substantial domestic outmigration, though in the last two years, modest increases have occurred.

Plan Bay Area represents a radical departure for the Bay Area in forcing higher residential and commercial densities by intensifying the current urban containment policies ("smart growth"). Most new development, both residential and commercial, would be forced into present urban neighborhoods. For example, this would mean the imposition of higher density, multi-unit housing in lower density areas throughout the Bay Area. The principal justification is the reduction of greenhouse gas (GHG) emissions.

Greenhouse Gas Emissions

The plan must project achievement of a *per capita* GHG emissions reduction meeting a 15 percent target established by the California Air Resources Board (CARB) over the period of 2005 to 2035. Plan Bay Area achieves this objective comfortably. Moreover, the null alternative ("2040 No Project Alternative") *also meets the objective,* which renders the favored "2040 Plan" unnecessary—it and its draconian policies *are not needed* to comply with appropriate law and regulation. Even so, the actual GHG emissions reductions appear likely to be substantially more.

The GHG emissions reductions contained in Plan Bay Area appear to be grossly underestimated and could be substantially less. Important factors include:

- Failure to include effects of new federal fuel economy regulations
- Understatement of emissions from climate policy initiative
- Exclusion of multi-unit emissions from shared energy consumption
- Small multi-unit house size assumption
- A high population projection

Moreover, Plan Bay Area does not apply an economic metric to its strategies for GHG emissions reductions. According to the United Nations Intergovernmental Panel on Climate Change (IPCC), it should cost no more than a range of $20 to $50 per ton to achieve sufficient GHG emissions. There are indications that the strategies in Plan Bay Area may be more costly than that standard, especially the housing and transportation strategies.

Jobs/Housing Balance and Transportation

In attempting to reduce GHG emissions, Plan Bay Area seeks to concentrate 77 percent of new housing and 63 percent of new jobs in priority development areas (PDAs) located within the present urban footprint. Despite this unprecedented densification, there would be little reduction in per capita driving and overall passenger vehicle travel would rise 18 percent. These modest results are not surprising. Research indicates that the jobs/housing balance has little impact on passenger vehicle travel per capita.

Further, attempts to establish localized jobs/housing balances within metropolitan areas have been unsuccessful, such as in the United Kingdom and in Stockholm. Even in Hong Kong, probably the best example of a metropolitan area that has met the objectives of urban containment policy (smart growth), the jobs/housing balance is somewhat less favorable than in the Bay Area, despite having a population density that is nine times greater. Further, U.S. Census surveys show that employment proximity is not a principal reason that households choose residential locations.

Plan Bay Area's land use strategies account for little in the overall GHG emissions reductions from land use.

Policies to establish a localized jobs/housing balance may only be achieved at the expense of economic growth because of their potential to fragment the Bay Area labor market by impeding mobility (which means minimizing travel times, especially to employment, between all parts of the Bay Area).

Plan Bay Area's land use strategies account for little in the overall GHG emissions reductions from land use. *Nearly all (95 percent) of the GHG emissions reductions in the Proposed Plan from 2010 that are attributed to land-use strategies are from energy efficiency and scoping measures, which would be achieved with or without the Proposed Plan.*

Transportation

There is a strong association between economic growth in metropolitan areas and the ability to reach the largest number of jobs in a particular time (such as 30 minutes).

The draconian measures (principally housing location mandates) in Plan Bay Area to reduce work trip travel distances would have little impact on daily driving distances. Indeed, the concentration of new residences and employment in the PDAs will result in higher population and employment densities, and is thus likely to result in greater traffic congestion. Research indicates that passenger vehicle use tends to rise at nearly the same rate as either population or employment.

Greater traffic congestion brings other consequences. As traffic slows and becomes more erratic, fuel economy is retarded. As a result each mile of travel produces more GHG emissions than at higher, more constant speeds typical of free flow conditions in urban areas. In turn, this greater fuel consumption intensifies air pollution in and adjacent to congested corridors, with negative health impacts. Higher density areas are associated with a greater intensity of air pollution.

Nearly all (95 percent) of the GHG emissions reductions in the Proposed Plan from 2010 that are attributed to land-use strategies are from energy efficiency and scoping measures, which would be achieved with or without the Proposed Plan

Plan Bay Area forecasts little transfer of demand from passenger vehicles to transit, despite this being a principal objective. This is to be expected, because transit is not time competitive with passenger vehicles except for trips to the central business districts (CBDs or downtowns) of San Francisco and Oakland, where work trip travel is one-half and 25 percent, respectively of commuting. Further, research indicates that substantial differences in density in areas not proximate to downtown have little impact on the travel behavior of households, whether in high-rise buildings or detached housing.

Transit's role in work trips is small outside the San Francisco and Oakland CBDs. Only 6 percent of work trips to these areas are made by transit. Even suburban employment centers with rapid transit access have modest transit market shares. The reason for this is illustrated by the fact that only 10 percent of employment locations can be reached on transit in 45 minutes by the average worker, far longer than the average work trip length by car. This limited access to employment is the result of the "last mile" problem; whereby transit services often do not take riders close enough to their destination to complete the trip with a convenient walk

Plan Bay Area's transit ridership projection for 2040 appears to be overly optimistic. A substantial ridership increase is projected, far more than the increase in transit service. This is contrary to longer term trends in the Bay Area and contrary to the transit industry experience that new services tend to attract fewer riders than existing services (since the strongest markets are already served). A decline in ridership seems more likely.

Plan Bay Area's transportation strategies account for little in the overall GHG emissions reductions from transportation. *Nearly all (93 percent) of the GHG emissions reductions in under the Proposed Plan from 2010 to 2040 that are attributed to transportation strategies are from fuel economy improvements, which would occur with or without the Proposed Plan.*

Housing Affordability

Housing is the largest expenditure of household budgets. Cost of living differences around the nation tend to be driven by differences in housing costs. The Bay Area has the highest cost of living among major metropolitan areas. It also has the most unaffordable housing. Approximately 80 percent of the excess cost of living in the Bay Area is attributable to higher housing costs.

There is considerable evidence that urban containment policies drive up the price of land for residential development, especially by rationing land. This is consistent with the economic principle that rationing of a good or service tends to lead to higher prices. Urban containment policies are in wide use in the Bay Area, especially urban growth boundaries, while house prices have escalated far out of proportion with the increase in household incomes.

The Bay Area did not always have excessively high housing costs. Before the implementation of stronger land use regulation in the 1970s, housing affordability in the Bay Area was much closer to that of other major metropolitan areas. Since that time, housing affordability, as measured by the median multiple (median house price divided by median household income) has increased to 2.5 times the national average in the San Francisco metropolitan area and more than three times the national average in the San Jose metropolitan area.

Brookings Institution economist Anthony Downs attributes such residential land cost increases to the failure to maintain a competitive market for land. The difference between house prices in the Bay Area and those in liberally (traditionally) regulated markets are principally in the cost of land.

The land-use policies of Plan Bay Area could exacerbate housing affordability in the Bay Area by forcing all development into relatively small areas.

Dartmouth University economist William Fischel has described this process by which stronger land use regulation destroyed housing affordability in California. There is considerable additional research on the strong relationship between urban containment policy and the loss of housing affordability. Based on his research, Economist Paul Cheshire at the London School of Economics has said that urban containment policy is *incompatible* with housing affordability. Other research also concludes that urban containment policy can hamper broader economic performance.

The land-use policies of Plan Bay Area could exacerbate housing affordability in the Bay Area by forcing all development into relatively small areas. This could also increase commercial land prices and, in consequence, business costs.

Low-Income Households

The Bay Area's lack of housing affordability and particularly its impact on low-income households is examined with concern in Plan Bay Area. Yet, Plan Bay Area includes no measures that would address the structural causes of the housing affordability, namely the urban containment policies that prevent housing affordability.

In addition, Plan Bay Area contains no significant measures that would improve mobility, especially to jobs, for low-income households. Alternatives to the presently proposed strategies should be examined. Materially improved mobility is critical to obtaining better employment opportunities. This is likely to be impossible, unless personal mobility (by passenger vehicles) strategies are employed.

Conclusion: Replacing the Unnecessary and Disruptive Plan Bay Area

Plan Bay Area forecasts only modest GHG emissions reductions in the preferred "2040 Plan" relative to the "2040 No Project Alternative." In exchange for these small gains, Plan Bay Area imposes draconian measures to force residents and businesses into small, high density areas. Moreover, Plan Bay Area would interfere with the housing choices of households in an unprecedented and *unnecessary* manner. At the same time, a number of important assumptions are excluded from Plan Bay Area or are challengeable. The correction of these potential deficiencies would result in much more steep reductions in GHG emissions.

A replacement Plan Bay Area should focus on strategies that respond to the reasons that people have chosen to move here, improving their quality of life (which is best measured by the extent of discretionary income, the most important determinant of which is housing affordability in the current context.

The business as usual (or "null") alternative, called the "2040 No Project Alternative," also meets the GHG emissions reduction objective set by the California Air Resources Board. There is no need for the "2040 Plan," which by its excessive intrusion into the housing market could lead to lower levels of economic growth as well as greater community and household disruption.

Plan Bay Area should be withdrawn and replaced by a plan that relies on up-to-date assumptions and allows household preferences (rather than those of ABAG or MTC) to determine housing location, subject to fundamental environmental standards.

The Purpose of Cities: Throughout history, cities (metropolitan areas), including the Bay Area, have attracted people seeking economic advancement.

A replacement Plan Bay Area should focus on strategies that respond to the reasons that people have chosen to move here, improving their quality of life (which is best measured by the

extent of discretionary income, the most important determinant of which is housing affordability in the current context. Policies that can retard the quality of life, such as by raising housing costs or restricting mobility, should be excluded. Further, a replacement Plan Bay Area should focus on eradicating poverty, which also involves maximizing discretionary income.

Equality of opportunity should drive the housing element of a replacement Plan Bay Area. Households should not be required to pay a higher than necessary share of their income for housing by public policy (such as urban containment policies). Such policies are harmful to households because they retard their affluence (by reducing their discretionary incomes). They are particularly harmful to younger households who often must leave the Bay Area to achieve and enjoy their preferred quality of life, as well as to low income households.

This is imperative for public policies to not unnecessarily increase the cost of living. This is especially true given the substantially deteriorated financial condition of the nation and California where factors such as unaffordable government employee pension obligations, rising taxes, and huge student loan burdens are likely to be more burdensome in the future.

It is concluded that Plan Bay Area *should be withdrawn* in its present form because it is not necessary to impose material policy changes to achieve the GHG emissions reduction objective. Recommendations are made for developing a replacement Plan Bay Area that would better respond to the needs of the Bay Area and its citizens, in a context of sufficient environmental protection.

1. INTRODUCTION AND SITUATION

The Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) are required by law to produce long-term plans relating to transportation, housing and environmental protection. A Draft Environmental Impact Review (DEIR) has been issued in connection with the currently proposed plan, "Plan Bay Area." This report evaluates Plan Bay Area and the DEIR.

The Bay Area

The Bay Area[1] has been a world leader in economic growth and household affluence. The most recent Brookings Institution *Global Metro Monitor* rates the San Jose metropolitan area as the second most affluent in the world, following Hartford (Connecticut). The San Francisco metropolitan area is also ranked highly, at 7th.[2]

Yet, there are substantial challenges in the Bay Area.

- The cost of living is the highest in the nation among the 51 metropolitan areas[3] with more than 1 million population.[4] This high cost of living is principally driven by housing costs, which are also the highest in the nation. These high costs reduce the discretionary income of households, which retards the quality of life as well as job creation by reducing purchases of goods and services.[5] The higher costs also translate into higher effective poverty rates (Section 6).
- Likely related to the high housing costs, the Bay Area lost approximately 65,000 net domestic migrants each year from 2000 to 2009. In the last two years, there has been a modest (12,500) annual increase, as the house price differential with the rest of the nation was moderated somewhat.
- Housing affordability is again deteriorating in the Bay Area and could lead, in the longer run, to a renewed exodus of residents to other parts of the nation. Many of these households could settle in and commute from the San Joaquin Valley, principally San Joaquin, Stanislaus and Merced counties.
- The Bay Area has some of the most serious traffic congestion in the nation (Section 4.1), which imposes costs on the economy and results in a less efficient labor market.

Plan Bay Area

Plan Bay Area's preferred "2040 Plan" relies on "urban containment policies.[6] These would steer most residential and commercial development to Priority Development Areas (PDAs) within the existing urban footprint, seeking to reduce per capita vehicle travel and largely forbidding development on or beyond the urban fringe.

Plan Bay Area is a radical departure from previous approaches, which would impose material behavioral changes on residents of the Bay Area. Plan Bay Area would intervene in real estate markets by forcing most new residential and commercial development into existing neighborhoods. This would mean the imposition of higher density housing in lower density communities throughout the Bay Area.

Most new housing would be multi-unit, as opposed to the single family detached units that represent the majority of houses in the Bay Area. Plan Bay Area also assumes that there will be no new demand for detached housing between 2010 and 2040, despite the fact that 56 percent of the current supply is detached. Finally, while Plan Bay Area projects a substantial increase in driving, little additional roadway capacity is planned.

The principal justification for this is the reduction of greenhouse gas (GHG) emissions, under Senate Bill 375 (the "Sustainable Communities and Climate Protection Act").

This Report

Any plan requires policy choices, as strategies are chosen to address the fundamental policy goals. This report will examine the strategies of Plan Bay Area for effectiveness in reaching the stated (or implied) policy goals. It will further identify the inherent choices implied by Plan Bay Area's objectives and strategies, not all of which are always apparent.

The approach will principally be to evaluate the preferred alternative, the "2040 Plan", with comparisons to the 2040 No Plan Alternative, which is based on the continuation of current housing and transportation trends (the "null" alternative).

It is concluded that the "business as usual" or "null" alternative, the "2040 No Project Alternative," meets the GHG emissions reduction objective and that, as a result, *Plan Bay Area should be withdrawn* in its present form. Recommendations are made for developing a replacement Plan Bay Area that would better respond to the needs of the Bay Area and its citizens in a context of sufficient environmental protection.

2. GREENHOUSE GAS EMISSIONS

A principal purpose of Plan Bay Area is to reduce greenhouse gas (GHG) emissions, consistent with the requirements of AB 32 (the "Global Warming Solutions Act") and SB 375 (the "Sustainable Communities and Climate Protection Act") as well as administrative orders.

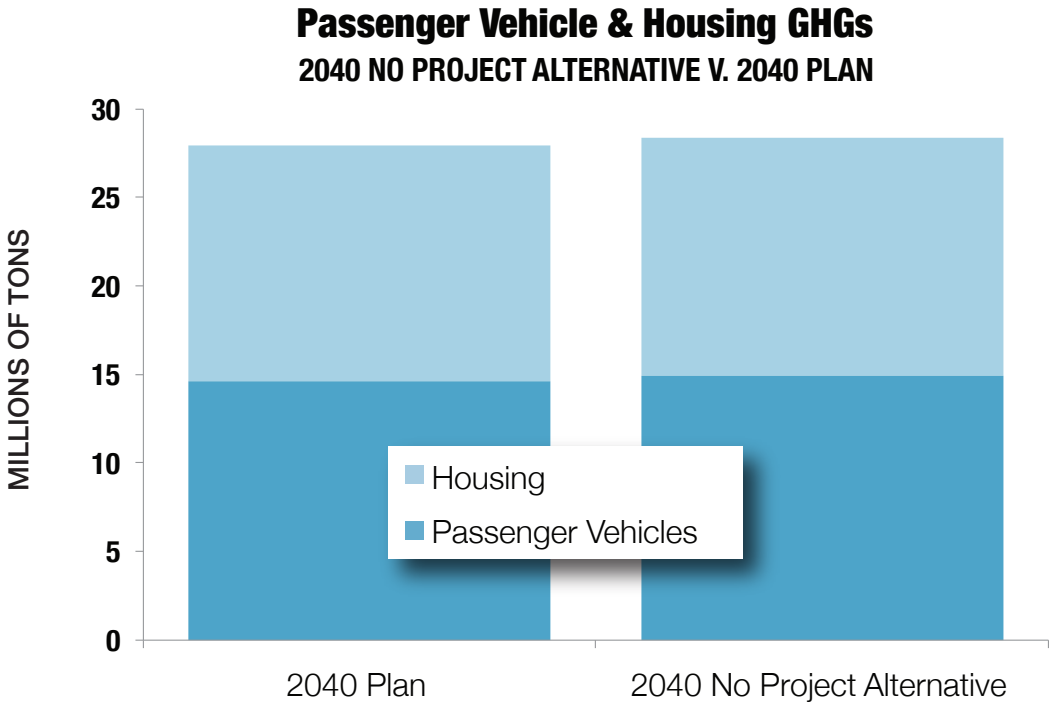
Objective

The plan must project achievement of a *per capita* GHG emissions reduction meeting a 15 percent target established by the California Air Resources Board (CARB) over the period of 2005 to 2035.[7] Plan Bay Area achieves this objective comfortably, with a per capita reduction of 34 percent for housing and transportation and a 40 percent per capita reduction n GHG emissions from passenger vehicles. [8]

Overall passenger vehicle travel would increase 18 percent under the "2040 Plan" from 2010 to 2040, at the same time as GHG emissions from passenger vehicles are reduced.[9] These GHG emission reductions are principally the result of stronger fuel efficiency requirements for passenger vehicles.

The GHG emissions reduction difference is negligible in the two sectors that are the primary focus of Plan Bay Area: passenger vehicles and housing. The "2040 Plan" is forecast to reduce GHG emissions only 1.5 percent more than the "2040 No Project Alternative" (Figure 1). Even so, the actual GHG emissions reductions appear likely to be substantially more.

Figure 1



Source: DEIR

Evaluation of Methods and Assumptions

The GHG emissions reductions contained in Plan Bay Area appear to be grossly underestimated and could be substantially less. The following factors contribute to the underestimation:

- Failure to include effects of new federal fuel economy regulations
- Understatement of emissions from climate policy initiative
- Exclusion of multi-unit emissions from shared energy consumption
- Small multi-unit house size assumption
- A high population projection

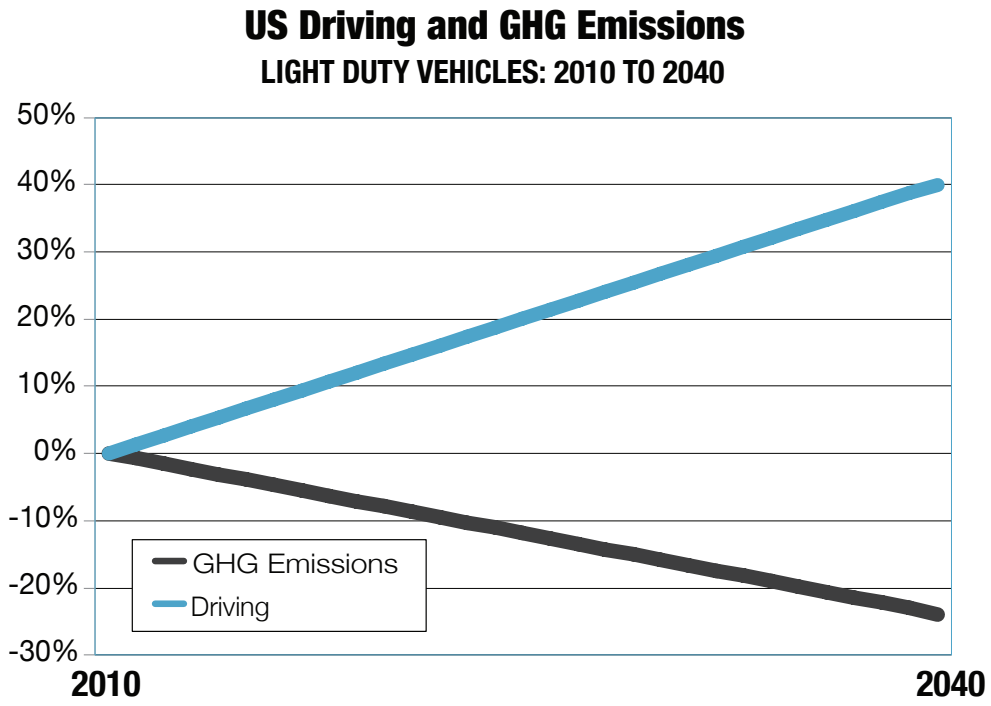
Adjustment to account for these issues would produce GHG emissions reductions sufficient to render the "2040 Plan" unnecessary. Each of these factors is described below.

Fuel Economy Assumption

Plan Bay Area takes into consideration the substantial improvements in passenger vehicle (automobile and light truck) fuel economy. However, Plan Bay Area does not consider the impacts of the much more stringent federal fuel economy standards adopted by the federal government in 2012. These regulations require fuel economy of 54.5 miles per gallon for new passenger vehicles by 2025.

The Energy Information Administration of the U.S. Department of Energy has produced GHG emissions projections that reflect these changes through 2040 in its *Annual Energy Outlook*.[10] Department of Energy projections indicate that passenger vehicle GHG emissions per mile will drop 46 percent between 2010 and 2040.[11] At the national level, this improvement is projected to reduce GHG emissions from passenger vehicles 24 percent even as driving increases 40 percent (Figure 2). Further, as Plan Bay Area EIS indicates, further fuel economy improvements are likely to occur in the longer term.[12]

Figure 2



Source: U.S. Department Of Energy

A replacement Plan Bay Area should be revised to include the further GHG emissions reduction effect of the Department of Energy projections.

MTC Climate Policy Initiative

Plan Bay Area assumes that the MTC Climate Policy Initiative will result in emissions reductions in addition to those that occur from driving less and fuel economy improvements. By 2040, this program would reduce GHG emissions by 1.6 million metric tons under the "2040 Plan" and 500,000 metric tons under the "2040 No Project Alternative". However, the referenced documentation for the seven "Climate Policy Initiatives" contains insufficient justification of the differences in assumptions between the "2040 Plan" and the "2040 No Project Alternative".[13]

A replacement Plan Bay Area should include GHG emissions from common energy consumption in multi-unit buildings.

It is not obvious that the Climate Policy Initiative strategies would yield materially different results under the two alternatives. For example, it is assumed that no emissions reductions would be achieved by the "smart driving" (for example, less aggressive driving) strategy or by a proposed "feebate" to impose a fee on new car purchases that exceed a GHG emissions standard, with funds rebated to purchasers of less GHG intensive cars.

A proposed "Commute Benefit Ordinance," would mandate employers with more than 50 employees to choose from contributing to employee commuting expenses, providing free shuttles to work or other alternatives that have "an equal or greater benefit in terms of reducing GHG emissions." This strategy seems unlikely to yield a material difference in GHG emissions between the "2040 Plan" and the "2040 No Project Alternative." It could further impair the competitiveness of the Bay Area by discouraging expansion of firms and new businesses attraction because of the higher costs the strategy would impose.

A replacement Plan Bay Area should attribute the same GHG emissions from MTC Climate Initiative strategy to each alternative considered, except to the extent that differences are clearly and objectively delineated.

Multi-Unit Housing Common Energy Consumption Emissions

Plan Bay Area seeks to substantially change the composition of housing types, with far more housing being multi-unit and much less being single family dwellings. Plan Bay Area assumes that multi-unit housing produces substantially less GHG emissions than single-family dwellings. However, this difference could be substantially overstated. The source used by Plan Bay Area[14] does not include emissions from shared or common energy that can frequently occur in multi-unit buildings.

Common energy is consumed, for example, by elevators, common area lighting, parking lot lighting, common air-conditioning, common heating and energy used in pumping water to upper floors. An analysis in Sydney (Australia) found that the inclusion of common energy in higher density resulted in *greater* GHG emissions per capita.[15]

A replacement Plan Bay Area should include GHG emissions from common energy consumption in multi-unit buildings.

Small Multi-Unit House Size Assumption

Plan Bay Area assumes that multi-unit house sizes will remain constant at the present national average of 1,172 square feet, approximately one-half the size of the average single family residence (detached or townhouse). This seems implausible.

However, if as Plan Bay Area projects, much of the new demand for housing will be steered into multi-unit housing, including a sizeable share of the market that would otherwise purchase larger single family houses, this national average floor space assumption is likely too conservative. A large share of the new owners is unlikely to be satisfied with housing sizes typical of rental apartments. Currently, approximately 15 percent of the Bay Area's home owners lived in multi-unit housing, while the overall home ownership rate is much higher, at approximately 55 percent.

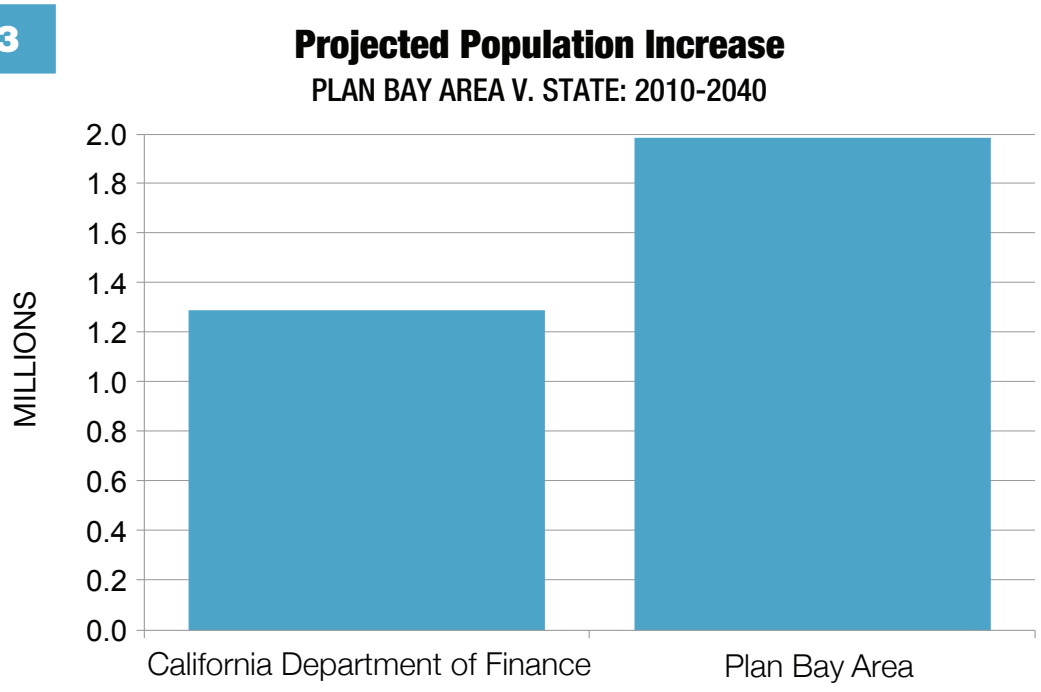
As is indicated in Section 2, there is only a marginal difference between the "2040 Plan" and the "2040 No Plan Alternative" in GHG emissions. A larger multi-unit house size could eliminate that difference because larger house sizes are associated with higher levels of GHG emissions.

A replacement Plan Bay Area should assume a higher multi-unit house size appropriate to reflect a square footage that would be likely with a larger home owner share.

Population Projections

Plan Bay Area uses an aggressive population projection placing the 2010 to 2040 population increase at 1.99 million. By contrast, the California Department of Finance (DOF) projects a 1.29 million increase in population between 2010 and 2040. Plan Bay Area thus projects an approximately 54 percent greater population increase than the state (Figure 3). Plan Bay Area's high population assumption would tend to *overestimate* GHG emissions in 2040 (because of the strong association between population and GHG emissions).

Figure 3



Sources: California Department of Finance & Plan Bay Area

There has been an attempt to reconcile these substantial differences. Generally, DOF has agreed that the Plan Bay Area population forecast is based on the assumption of greater in-migration, which would result from job growth.[16] However, substantial job growth seems unlikely to occur with the Bay Area's horrendous housing affordability, the worst among major metropolitan areas. As of the third quarter, 2012, Bay Area house prices *in relation to incomes* were more than double that of other major metropolitan areas.[17] More recent data indicate a further deterioration of housing affordability (Section 5).[18]

The California Department of Finance is the principal authority for projecting population in the state. The replacement Plan Bay Area should assume DOF official population forecasts. This would be the present DOF population projection, unless DOF revises its official county projections *throughout the state* to reflect revised methodology.

Revised GHG Emissions Reduction Projections

Adjusting the Plan Bay Area projections to account for the issues above results in a substantial reduction in GHG emissions (Figure 4). Application of the adjustments to the "2040 No Project Alternative" yields a 40 percent reduction in GHG emissions (overall national emissions, as opposed to per capita emissions), from passenger vehicles in 2040 compared to 2010, and a 37 percent reduction overall, including housing (Table 1).

Additional reductions are also likely, but not estimated in Table 1 for lack of data. These include (1) appropriate allocation of GHG emissions reductions to the "2040 No Project Alternative" from the MTC Climate Initiative Program; (2) allocation of GHG emissions from common energy consumption in multi-unit housing, and (3) a multi-unit house size appropriate for the larger projected market of homeowners.

Table 1

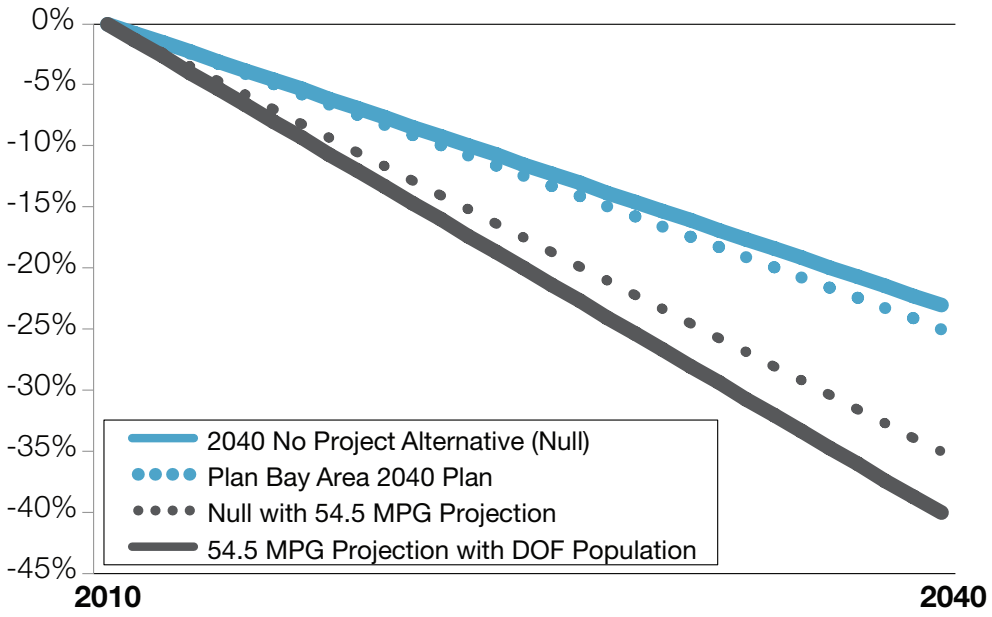
Plan Bay Area EIR GHG Emissions Reductions Adjusted for Questionable Assumptions

	2010	2040 No Project	2040 Plan	2040 No Project with EIA	2040 No Project with EIA & Department of Finance Poulation	Source of Base Data (DEIR)
Daily Passenger Vehicle Miles (Millions)	136.4	164.2	160.9	164.2	151.9	2.4-9
Population	7,151,000	9,137,000	9,137,000	9,137,000	8,434,000	3.1.29 & DOF/ABAG
ANNUAL GHG EMISSIONS (Metric Tons)						
Passenger Vehicle	19,383,000	14,927,000	14,631,000	12,583,000	11,641,000	3.1.29
Change from 2010: Metric Tons		(4,456,000)	(4,752,000)	(6,800,000)	(7,742,000)	
Change from 2010: Percentage		-23%	-25%	-35%	-40%	
Compared to 2040 No Plan Alternative			-2%	-16%	-22%	
Annual per Capita GHG Emissions	2.71	1.63	1.60	1.38	1.38	
Change from 2010: Metric Tons		(1.08)	(1.11)	(1.33)	(1.33)	
Change from 2010: Percentage		-40%	-41%	-49%	-49%	
Compared to 2040 No Plan Alternative			-2%	-16%	-16%	
TOTAL GHG EMISSIONS (Metric Tons)	48,846,000	42,895,000	41,344,000	39,296,000	36,355,000	3.1.29
Change from 2010: Metric Tons		(5,951,000)	(7,502,000)	(9,550,000)	(12,491,000)	
Change from 2010: Percentage		-12%	-15%	-20%	-26%	
Annual per Capita GHG Emissions	6.83	4.69	4.52	4.30	4.31	
Change from 2010: Metric Tons		(2.14)	(2.31)	(2.53)	(2.52)	
Change from 2010: Percentage		-31%	-34%	-37%	-37%	
Compared to 2040 No Plan Alternative			-4%	-8%	-8%	
ADDITIONAL GHG EMISSION REDUCTION FACTORS NOT INCLUDED IN 2040 NO PLAN ALTERNATIVE						
Equalization of MTC Climate Initiative Savings						
Allocation of shared energy consumption emissions to multi-unit housing						
Multi-unit house size						

Figure 4

Light Vehicle GHG Emissions: 2010-2040

BAY AREA PLAN & REVISED ASSUMPTIONS IN TEXT



Sources: Plan Bay Area and assumptions in text

The Cost of GHG Emissions Reduction

Any strategy for reducing GHG emissions should be cost effective. Around the world there is considerable concern that strategies adopted to reduce GHG emissions do not materially reduce economic growth because that would reduce affluence and increase poverty (and could even threaten social stability[19]). For example, a report to a July 2008 G-8 conference stated that the cost of GHG emissions reduction could be low and that "the challenge could be met without damaging the economy."[20]

The United Nations Intergovernmental Panel on Climate Change (IPCC) has provided a benchmark, estimating that sufficient GHG emissions reductions can be achieved at no more than $20 to $50 per metric ton. Any such expenditure in excess of this range constitutes a misallocation of resources and has the potential to retard household affluence and the economy.[21]

It is not sufficient to simply adopt policies that reduce GHG emissions without applying a cost metric. Policies must be chosen based on their relative cost effectiveness, otherwise there is the potential for interfering with economic growth, reducing job creation, and household affluence while increasing poverty.

Moreover, "across-the-board" approaches that would apply an overall percentage reduction to all sectors to GHG emissions reduction would be both inappropriate and counter-productive.

Plan Bay Area's assumption of the necessity for "across the board" reductions in transportation that match the overall 80 percent reduction objective is inappropriate.[22] Emission reduction strategies should be

evaluated based upon their cost per ton. In some sectors, this will yield greater percentage reductions and in others lesser percentage reductions. This approach could threaten economic growth, household affluence, and poverty eradication by relying on excessively expensive strategies.

Policy decisions need to be made based upon their relative cost-effectiveness. The IPCC, for example, estimates that the potential for GHG reduction in the transportation sector is less than one half of its contribution to overall GHG emissions.[23] The European Conference of Ministers of Transport acknowledged a lesser potential for transportation: "Transport and other sectors are ... expected to contribute correspondingly less to overall emissions reduction strategies."[24]

In the United States, McKinsey & Company and the Conference Board found that sufficient GHG emissions reductions can be achieved without reducing driving or living in denser housing.[25] This is illustrated by the anticipated improvements in automobile fuel efficiency, which drive a disproportionate share of the GHG emissions reductions in Plan Bay Area.

> Plan Bay Area's assumption of the necessity for "across the board" reductions in transportation that match the overall 80 percent reduction objective is inappropriate.

While Plan Bay Area does not subject its GHG emissions reduction strategies to an economic test, some such analysis has been in related documents. For example, some of the proposed "Climate Policy Initiatives" would substantially exceed the IPCC maximum cost guideline per ton of emission reduction. A 2012 document[26] indicated that four of six listed strategies exceeded the $50 per ton maximum. The most costly strategy was more than $800 per ton, or between 16 and 40 times the IPCC maximum.

Elements in the previous MTC *2035 Transportation Plan,* estimated an annual cost of from $200 to $800 per ton of GHG for its bus improvement strategies and from $800 to $5800 per ton for its rail and ferry improvements.

Moreover, the cost of GHG emissions reduction in the housing and commercial sector needs to be assessed. The costs should include those of any likely house or commercial property cost increases.[27]

In view of the potential damage to the economy and the quality of life, it is important that GHG emissions reduction strategies be subject to a cost test. A replacement Plan Bay Area should include an economic analysis of each strategy and exclude any strategy that exceeds $50 per GHG ton reduced.

GHG Emissions Reduction Recommendation

A replacement Plan Bay Area should use the most current projections, apply them objectively across all alternatives and not include measures that are more severe than is required by legally binding objectives.

3. LAND USE STRATEGIES

A principal Plan Bay Area strategy is to concentrate most new residents in infill development, within approximately 220 priority development areas (PDAs). The PDAs would cover just five percent of the region's land. Plan Bay Area seeks to locate 77 percent of the new residences and 63 percent of the new jobs between 2010 to 2040 in the PDAs.

> *Plan Bay Area calls for focused housing and job growth around high-quality transit corridors, particularly within areas identified by local jurisdictions as Priority Development Areas (PDAs). This land use strategy is intended to enhance mobility and economic growth by linking housing/jobs with transit, thus offering a more efficient land use pattern around transit and a greater return on existing and planned transit investments.*[28]

Localized Jobs/Housing Balance

Plan Bay Area seeks to reduce automobile travel by improving the localized "jobs/housing," balance, which would seek a one to one relationship between resident workers and jobs within localized geographical areas within the Bay Area.[29]

> *Planning for a jobs/housing balance is based on the premise that the number of work trips by car, the overall number of vehicle trips, and the resultant vehicle miles traveled can be reduced when there are sufficient jobs available locally to balance the employment demands of the community.*

Plan Bay Area also supports the concept of a jobs/housing balance, noting that:

> *Improving the jobs/housing balance so that the number of jobs is approximately the same as the number of employed residents—a ratio of 1:1—requires carefully planning for the location, intensity, and nature of jobs and housing in order to encourage a reduction in vehicle trips and miles traveled and a corresponding increase in the use of mass transit and alternative modes of transportation, such as carpools, bicycling, and walking.*

Plan Bay Area notes that households living closer to transit travel less frequently and shorter distances than those living farther away from transit. The reduction is cited as being on the order of 30 percent.

> *MTC's 2006 report, "Transit-Oriented Development: New Places, New Choices in the San Francisco Bay Area," supports the proposition that transit-oriented development can reduce the rate of car ownership. According to this report, almost 30 percent of households living within a half-mile of a rail or ferry station do not own cars. Households closer to transit also log fewer daily miles on the cars they do own (20 miles per day for households less than a half-mile from transit, versus 39 to 55 miles per day for households living more than one mile from transit). Furthermore, households close to transit report a higher share of daily work and non-work trips on foot or by bike than households farther from transit.*

Yet, Plan Bay Area' yields only a miniscule reduction in per capita (per household) travel of only 2 percent in 2040.[30] This is not surprising. In a meta-analysis, Ewing and Cervero find that each 10 percent increase in the jobs/housing balance yields only a 0.2 percent reduction in per capita vehicle travel.[31]

Localized Jobs/Housing Balance: The Record

Efforts to establish localized jobs/housing balances have been largely unsuccessful in materially changing metropolitan travel patterns because people tend to seek the employment opportunities that serve their needs best in the entire labor market.

In the United Kingdom, "self sufficient" new towns (such as Milton Keynes and Stevanage) were built in the exurbs with sufficient employment for the new residents. The jobs and the residents materialized, but the shorter travel distances did not. The 2001 census shows that residents of the new towns travel to work, on average, a distance twice the diameter (distance across) of the new towns they live in.[32] A large share of the residents work in other towns or in the large cities. Other workers commute long distances from other parts of the metropolitan area to job locations in the new towns.

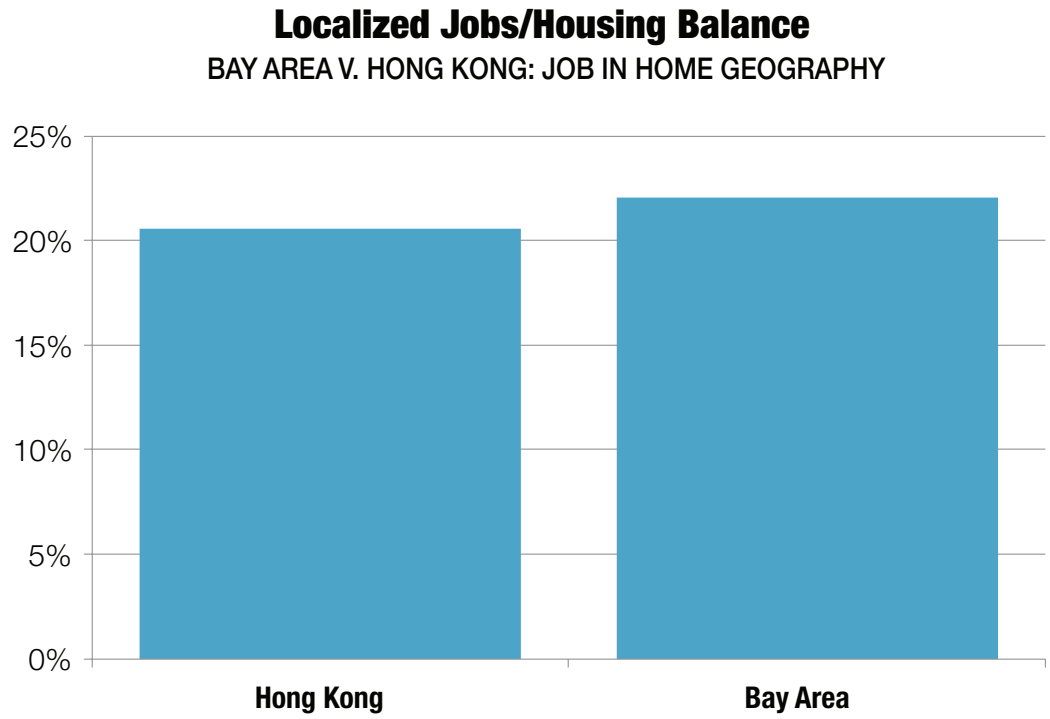
Urbanologist Peter Hall of the London School of Economics made similar findings with respect to Stockholm's satellite communities. Despite planning intentions similar to those in the U.K., the overwhelming majority of people work outside the communities in which they live.[33]

The elusiveness of a localized jobs/housing balance is also illustrated by comparing Hong Kong with the Bay Area. Probably no urban area in the world achieves the objectives of urban containment policy as well as Hong Kong. Hong Kong is the highest density urban area with more than 1 million residents in the high income world (over 65,000 per square mile).[34] Hong Kong also has the highest mass transit work trip market share of any major metropolitan area in the high income world (70 percent).[35] By comparison, the urban area density in the Bay Area is approximately 6,000 per square mile, one-tenth that of Hong Kong, while the transit work trip market share is only one sixth that of Hong Kong (11 percent).

By comparison, the 26 Bay Area "places" of comparable geographical size have a localized jobs-housing balance of 22.1 percent, despite having a smaller average land area (20.0 square miles).

Yet, the Bay Area, with its far lower urban population densities and far lower mass transit market share has a localized jobs/housing balance competitive with that of Hong Kong (Figure 5).[36] The 2011 census indicates that only 20.6 percent of Hong Kong's resident workers commute to jobs in their own districts (average district area 23.7 square miles).[37] By comparison, the 26 Bay Area "places" of comparable geographical size have a localized jobs/housing balance of 22.1 percent, despite having a smaller average land area (20.0 square miles). [38]

Figure 5



Sources: Calculated from Hong Kong Census and American Community Survey

The Elusive and Counter-Productive Jobs/Housing Balance

The comparatively low jobs/housing balances exhibited not only in the Bay Area but also in Hong Kong are not surprising. For example, the 2011 *American Housing Survey* indicates that among people who moved in the previous year, only 13 percent moved to be closer to their employment: 7 percent among home owners and 15 percent among renters. In short, attempts to establish localized jobs/housing balances in metropolitan areas are likely to fail because planners cannot anticipate where people will prefer to live, where they will work and where their next jobs will be. This is made even more complex by the large number of households with more than one worker, which can make locating the residences near the multiple employment location difficult, even in the small minority of cases where proximity to the job is the principal consideration.[39]

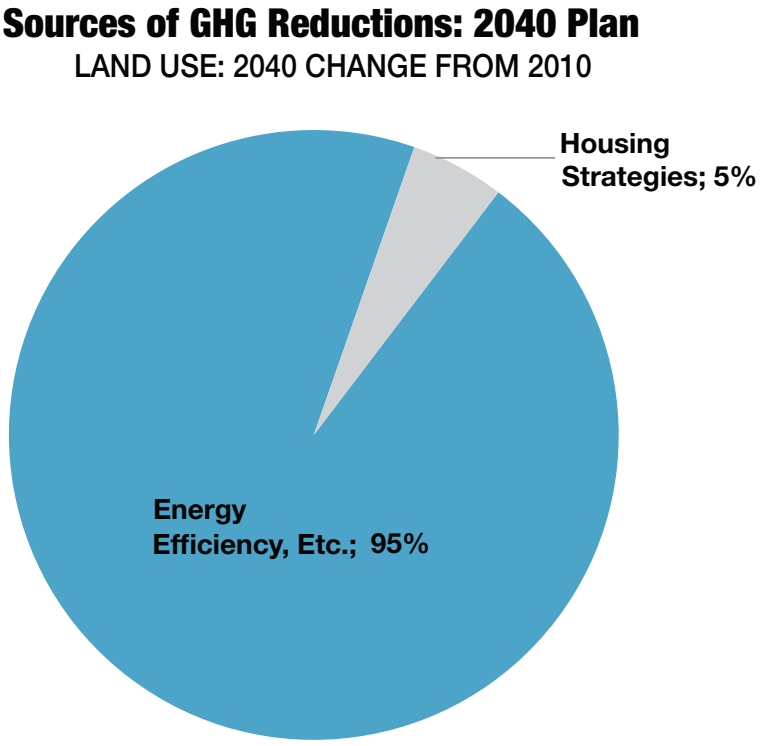
The strategy of the jobs/housing balance is at odds with the concept of the metropolitan area as a labor market in which economic growth is increased as mobility is maximized. According to former World Bank principal urban planner Alain Bertaud, the economic efficiency of the city requires *avoiding any spatial fragmentation of labor markets.*[40] This raises the concern that a localized "jobs/housing" balance may only be achieved at the expense of economic growth (household affluence and the reduction of poverty).

Source of GHG Emissions Reductions: Fuel Efficiency, Little from Plan Bay Area

The GHG emissions gains from the land use strategies of Plan Bay Area result principally from technological improvements, rather than planning initiatives (as is also the case with transportation, as shown in Section 4.6).

Plan Bay Area's land use strategies contribute little to GHG emissions reduction. Approximately 95 percent of the reduction in GHG emissions from underlying assumptions of energy efficiency improvements and other measures (referred to as "Scoping Plan Reductions in the DEIR), with the same reduction under the "2040 Plan" and the "2040 No Project Alternative." The other five percent is from the land use policies of the "2040 Plan" and represent the difference from the "2040 No Project Alternative" (Figure 6).

Figure 6



Source: DEIR

Land Use Recommendation

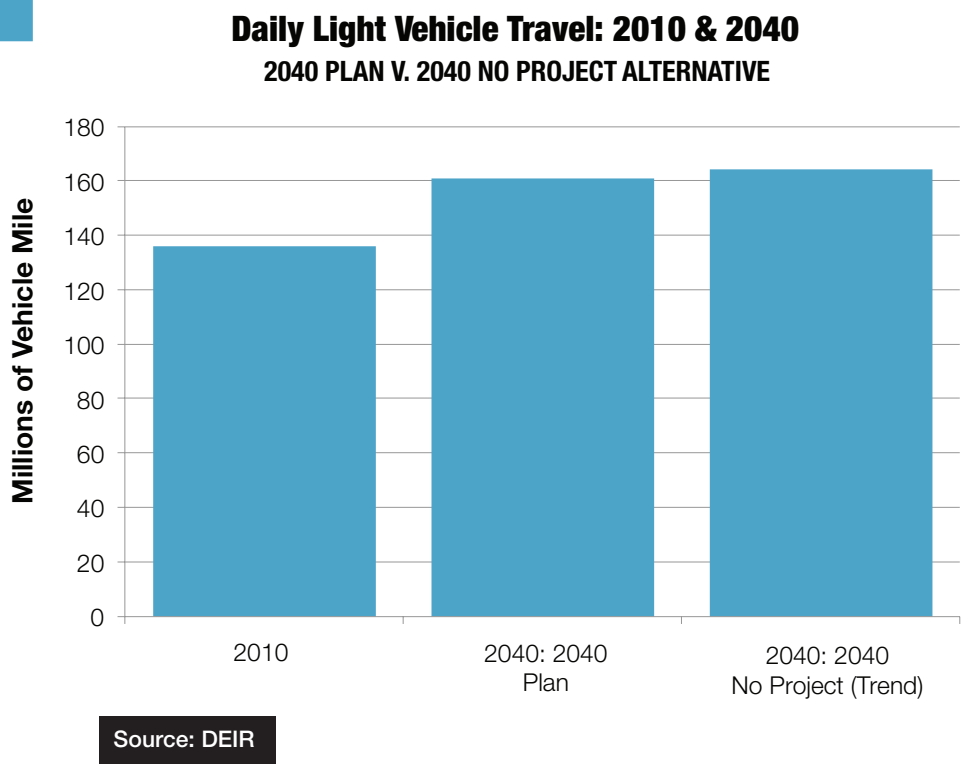
The housing (PDA) strategies of Plan Bay Area are not necessary to achieve the required GHG emissions reductions. A replacement Plan Bay Area should exclude housing location or type mandates or guidelines.

4. TRANSPORTATION

Greater mobility—the ability to travel quickly between all points in the metropolitan area—improves the economic performance of cities.[41] This broadens affluence and reduces poverty. Prud'homme and Lee (University of Paris), Hartgen and Fields (University of North Carolina-Charlotte), Cervero (University of California) and others, who have shown that the more jobs people can reach in a fixed period of time (such as 30 minutes), the greater the economic production (which leads to greater job creation, larger household discretionary incomes and lower rates of poverty.[42] The relationship between mobility and economic growth means that a principal purpose of transportation policy should be to reduce hours of travel delay in the area.

Despite the draconian land use interventions that seek to minimize travel distances between homes and work, the preferred "2040 Plan" would result in only two percent less driving volume than in the "2040 No Project Alternative" (Figure 7). Travel by passenger vehicles would increase 18 percent, and passenger vehicles would remain the dominant mode of travel.

Figure 7



Source: DEIR

Density and Traffic Congestion

The increase in passenger vehicle travel would, according to Plan Bay Area, be accommodated on a roadway system little expanded from the present. Traffic would further be more concentrated in PDAs, in which population densities and employment densities would be higher, generating many more trips. Both of these factors could be expected to increase traffic congestion.

There is a strong relationship between higher population and employment density and greater traffic volumes. A meta-analysis of nine studies examining per capita or per household automobile use by Ewing and Cervero associates a doubling of density with a miniscule decline in driving (approximately a 0.4 percent reduction in *per capita* driving for each 10 percent increase in population density).[43] This means that with a 10 percent increase in population density (people in a specific geographic area), total driving would rise nearly 10 percent, *nearly the same as the population increase.*

Further, Ewing and Cervero find no change in driving based upon changes in employment density. Thus, as population and employment rise, the volume of travel in a particular area rises nearly as much, which leads to greater traffic congestion

Our review of more than 180 metropolitan areas in Europe, North America, and Asia indicated a strong relationship between higher density and greater traffic congestion. The same research, covering 109 metropolitan areas, also indicated that higher urban population density was strongly associated with longer work trip travel times.[44]

Already, the Bay Area is rated as having intense traffic congestion. The San Francisco metropolitan area is routinely rated second worst among U.S. major metropolitan areas, while the San Jose metropolitan area is rated fourth by both Tom Tom[45] and INRIX.[46] San Jose has the worst traffic congestion among metropolitan areas between 1.0 and 2.5 million population in both traffic congestion rating systems. This greater traffic congestion is, at least partially, the result of the Bay Area's high population density, with the San Francisco urban area and the San Jose urban area trailing only the Los Angeles area as the highest density major urban areas in the United States.[47]

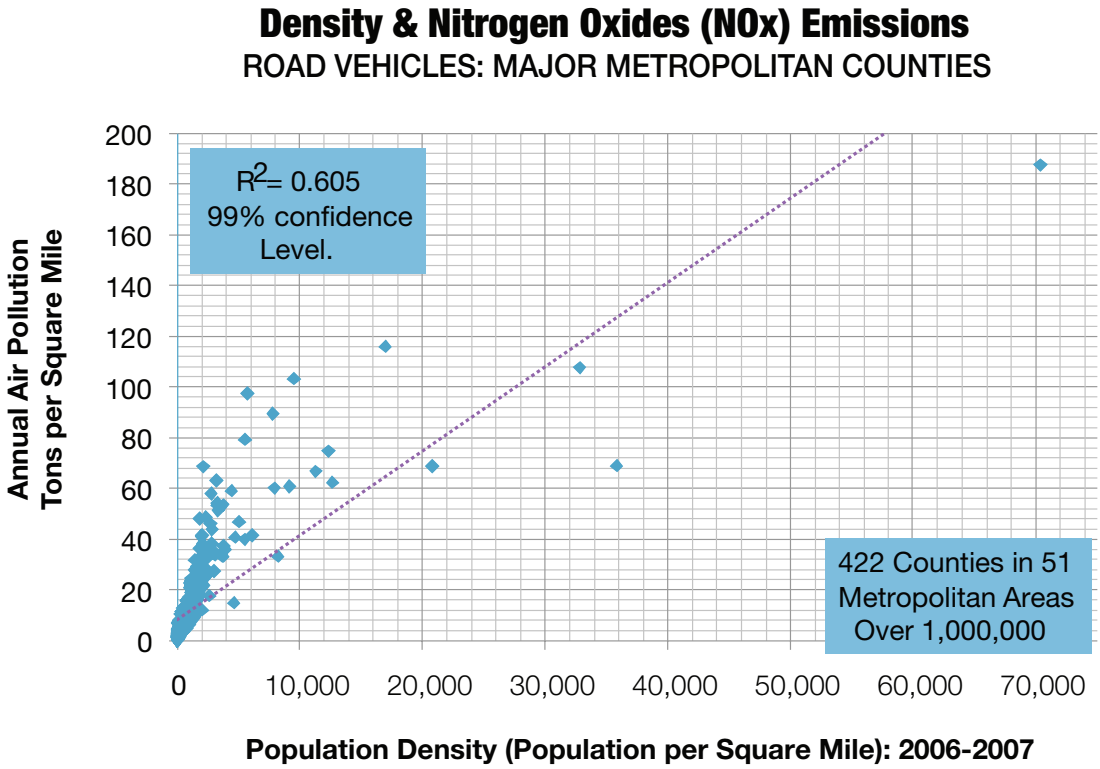
Diminishing GHG Emissions Returns: Reducing Travel

Greater traffic congestion would reduce GHG emissions that might otherwise be expected from reducing driving (albeit, the modeled driving in Plan Bay Area is small). Each gallon of gasoline produces the same volume of GHG emissions. Because cars consume more fuel at lower speeds and in greater traffic congestion, as density increases congestion, the anticipated reduction in GHG emissions is reduced or can even be eliminated. Greater fuel consumption in congested traffic can result in GHG emissions over 70 percent higher per mile than in free-flow traffic.[48]

Health Impacts of More Intense Traffic Congestion

The greater traffic congestion is likely to have negative health impacts. According to the American Heart Association and the U.S. Environmental Protection Agency, air pollution increases along congested corridors. There is a strong relationship between more intense air pollution and higher population density (Figure 7).[49]

Figure 8



Source: Calculated from EPA data

Transferring Passenger Vehicle Demand to Transit

Despite the priority given to transit strategies, Plan Bay Area does little to reduce automobile demand. Indeed, passenger vehicle travel under Plan Bay Area is only two percent less than under the "2040 No Project Alternative." Transit's share of total trips would rise from only five percent to seven percent.[50]

The modest modeled transfer of demand from passenger vehicles is to be expected given the strengths and weaknesses of transit. The principal driver of transit work trips by people who have access to automobiles is proximity to downtowns (CBDs). This is because rapid transit service and high levels of conventional transit service focus on the CBDs, not other areas with employment throughout the Bay Area.

At the national level, the predominance of CBDs in transit commuting is indicated by the fact that 55 percent of transit commuting in the United States is to the core municipalities of New York, Chicago, Philadelphia, Boston, San Francisco, and Washington, DC. This is nearly ten times their share of national jobs (six percent). Most transit commuting to these "transit legacy cities" is to the CBDs,[51] which are typically 10 to 20 percent of metropolitan employment. In the Bay Area, the San Francisco CBD represents less than 10 percent of Bay Area employment.[52]

Further indication of transit's ridership concentration to downtown is Statistics Canada research indicating that outside six miles from downtown, people in higher density housing use cars at a rate similar to those in nearby detached housing.[53]

This finding is echoed in Melbourne, Australia, where regional planners long ago attempted a land-use strategy similar to Plan Bay Area PDAs. The concept was that by locating residences along corridors with more intense transit service, people would use transit in significantly greater numbers for the work trip. Researchers found that the strategy largely failed, because transit could not compete with the automobile in providing rapid trips to the highly dispersed employment pattern of the metropolitan area.[54]

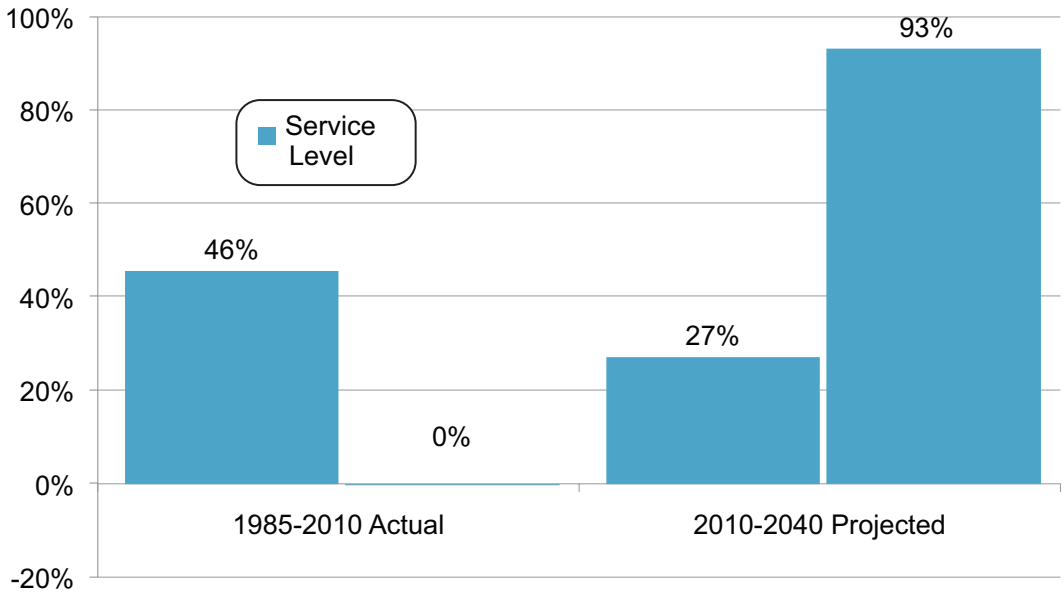
Transit commuting is much more modest to jobs outside the San Francisco and Oakland CBD (which has a 25 percent transit work trip market share). Transit has an approximately 50 percent share of commuting to the San Francisco CBD and a 25 percent share to downtown Oakland. On average, approximately 6 percent of work trips to these areas are made by transit. Overall, the density of employment outside the two largest CBDs is approximately 2300 per square mile. The Oakland CBD is at least 20 times as dense and the San Francisco CBD is approximately 50 times as dense. Even suburban employment centers with rapid transit access can have modest transit market shares. For example, only nine percent of employees who work in the San Jose core employment center use transit. The Walnut Creek employment center attracts only four percent of its workers by transit. These cases indicate the difficulty of using transit to smaller employment centers outside the largest CBDs.[55]

This is to be expected. According to a Brookings Institution report,[56] more than 90 percent of Bay Area resident workers live within walking distance of a transit stop. But being near a transit stop does not translate into convenient access to most destinations. Only about 10 percent of employment locations can be reached on transit in 45 minutes by the average worker. In contrast, more than 80 percent of the Bay Area's workers have a work trip travel time of less than 45 minutes (largely commuting by passenger vehicles).[57]

There is a fundamental difference between access to a transit stop and access to a car in the garage parking lot or on the street. The car can take the driver to 100 percent of the business or residential locations in the entire Bay Area, and door-to-door is nearly always faster than any other mode. For example, in the Bay Area, 72 percent single occupant worktrips are less than 30 minutes. By comparison, only 22 percent of transit users reach their work locations in 30 minutes (Figure 9).[58]

Figure 9

Transit Service & Ridership Increases
1985-2010 COMPARED TO 2010-2040



Sources: DEIR & National Transit Database

This limited access to employment is the result of the "last mile" problem, whereby transit services often do not take riders close enough to their destination to complete the trip with a convenient walk.

Optimistic Plan Bay Area Transit Ridership Projection

The projected transit ridership increases in Plan Bay Area appear to be overly optimistic. Between 2010 and 2040, Plan Bay Area assumes a 93 percent increase in transit ridership.[59] Yet, over the same period, Plan Bay Area projects that transit service will increase only 27 percent (seat miles). It is unusual for transit ridership to increase faster than the increase in transit service, simply because the transit services that are already operating are in markets with the highest demand. New services are routinely less well patronized.

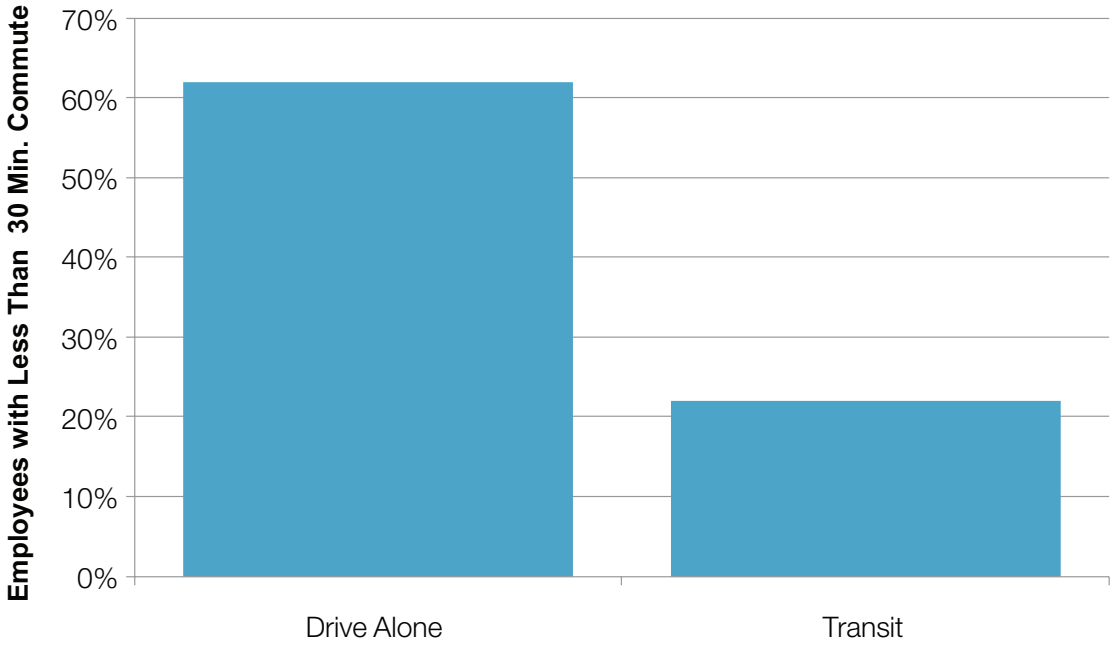
This increase in transit ridership is in contrast to recent longer term trends. Between 1985 to 2010. Transit service levels were increased 46 percent in the Bay Area.[60] However, ridership[61] declined slightly (Figure 10). The Plan Bay Area ridership and service projections indicate a 3.45 ratio of new ridership to new service, which is considerably higher than the minus 0.01 ratio between 1985 and 2010 (Figure 11).

It may be implausible to project such a large increase in transit ridership. Given recent Bay Area trends and the lower productivity of new service, a decline in ridership seems more likely.

Figure 10

Commute Trips Less than 30 Minutes

BAY AREA COMBINED STATISTICAL AREA: 2011

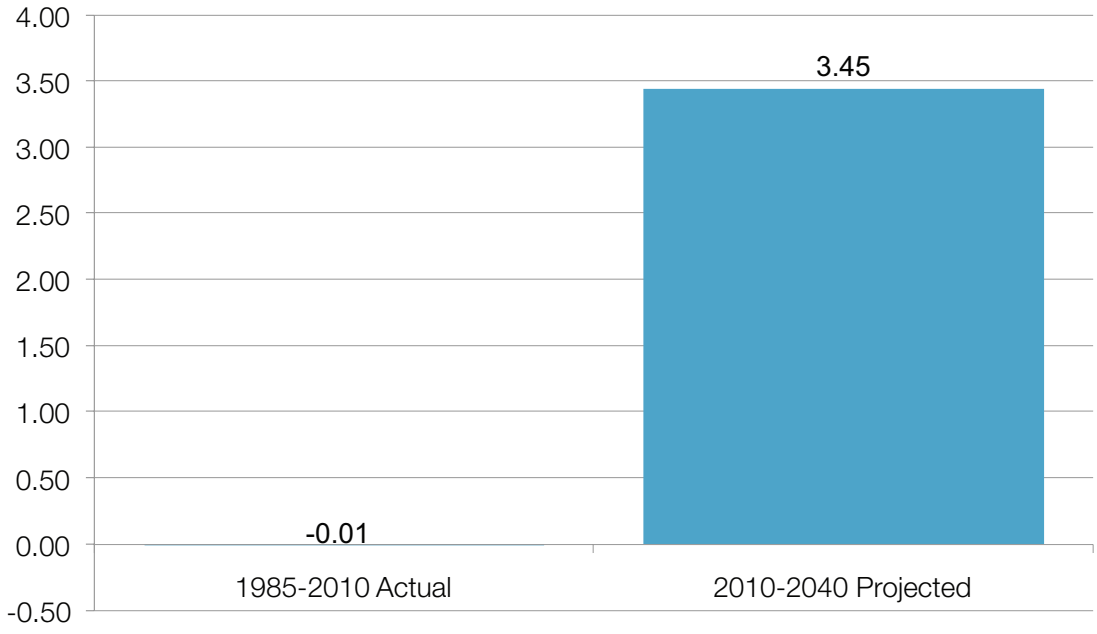


Source: American Community Survey

Figure 11

New Passenger/Service Ratio

1985-2010 COMPARED TO 2010-2040



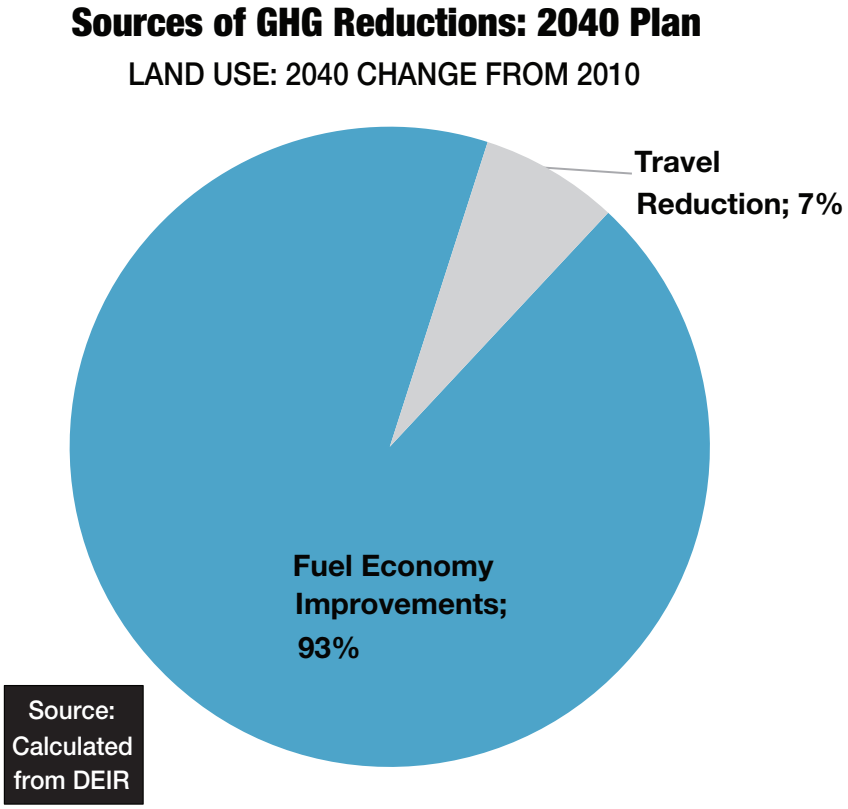
Sources: National Transit Database & Plan Bay Area

Source of GHG Emissions Reductions: Fuel Efficiency, Little from Plan Bay Area

As in the case of land use (Section 3.4), the principal GHG emissions transportation reductions gains under Plan Bay Area result from technological improvements, rather than planning initiatives.

Plan Bay Area's passenger vehicle mileage reduction strategies contribute little to GHG emissions reduction from passenger vehicles. Approximately 93 percent of the reduction from 2010 to 2040 in the "2040 Plan" is due to improved fuel economy and is thus independent of the intrusive strategies of Plan Bay Area (Figure 12). The seven percent from reduced travel is the difference between the "2040 Plan" and the "2040 Project Alternative."

Figure 12



Transportation Recommendation

A replacement Plan Bay Area should establish objectives for materially reducing traffic congestion and should recommend transportation policies based principally upon the cost per reduced delay hour, giving priority to less costly initiatives.

5. COST OF LIVING AND HOUSING AFFORDABILITY

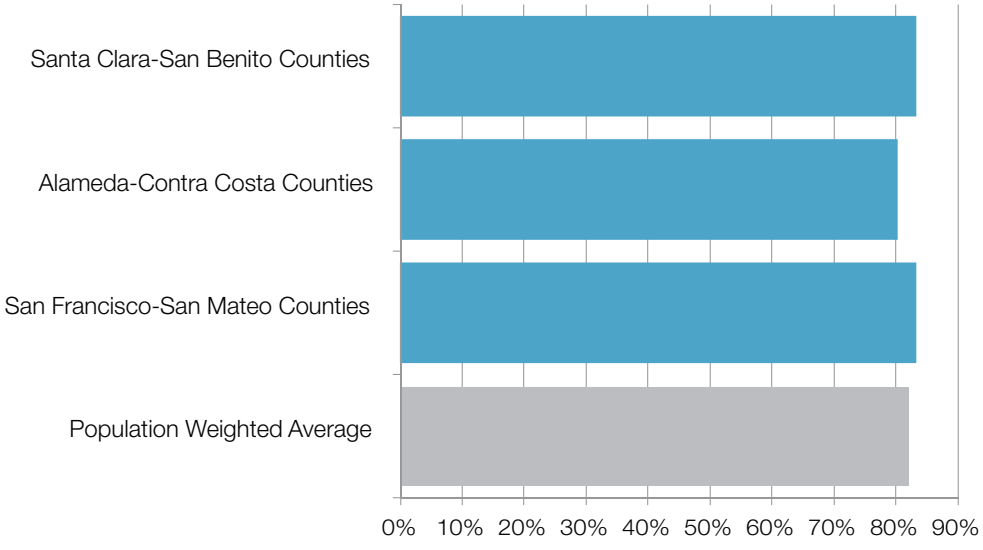
The Bay Area has the highest cost of living among the nation's major metropolitan areas. The *C2ER Cost of Living Index* indicates that the cost of living is 48 percent higher in the Bay Area than the national average.[62] This means that a dollar earned by Bay Area residents has a purchasing power of only $0.68 compared to the national average (of $1.00). Compared to less costly areas, such as fast growing Nashville or Columbus (Ohio), the value of a Bay Area dollar drops to nearly $0.60.

It is estimated that 80 percent of the Bay Area's higher cost of living is attributable to its higher cost of housing[63] (Figure 13).[64]

Where housing costs are higher than necessary, the average household is necessarily less affluent. Moreover, higher house prices are an important barrier to reducing poverty. Households at all income levels will have less discretionary income to spend, which leads to lower levels of job creation because the purchase of goods and services is reduced by the higher cost of housing.

Figure 13

Housing Share of Excess Cost of Living
BAY AREA COMPARED TO NATIONAL



Calculated from C2ER data

Housing Affordability in the Bay Area

The Bay Area's lack of housing affordability can be traced to its urban containment strategies. Under Plan Bay Area, these strategies will become even more restrictive and result in raising house prices even higher.

A few California markets, including in the Bay Area, reached median multiples of 10.0 or above during the housing boom.

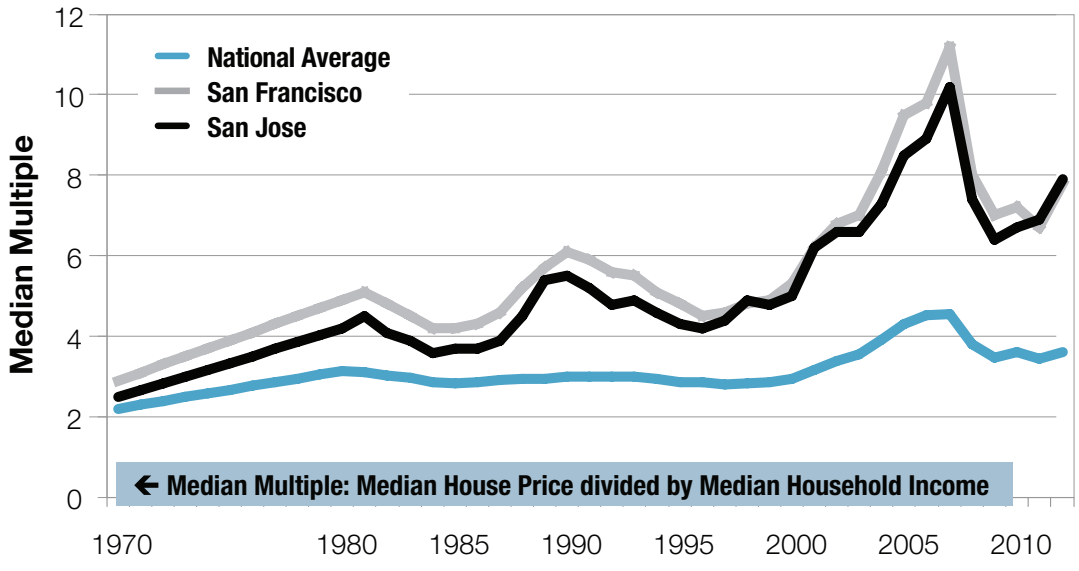
The Bay Area has the highest house prices relative to incomes in the nation (measured by the median multiple, which is the median house price divided by the median household income). In late 2012, the San Jose metropolitan area had a median multiple of 7.9, the highest among the 51 major metropolitan areas. The San Francisco metropolitan area had a median multiple of 7.8, the second highest among the 51 major metropolitan areas. Bay Area house prices *in relation to incomes* were more than double that of other major metropolitan areas. More recent data indicate a further deterioration of housing affordability. For the year ended March 31, 2013, median house prices rose more than 30 percent in the San Francisco and San Jose metropolitan areas. Each of these increases is above the 11 percent national average, which was characterized by the National Association of Realtors as the "best year-over-year performance in over seven years" (the largest price increase). [65]

The Bay Area was not always excessively expensive. Before the implementation of stronger land use regulation in the 1970s, housing affordability in the Bay Area was much closer to that of other major metropolitan areas (Figure 14). Since that time, housing affordability, as measured by the median multiple (median house price divided by median household income) has increased 2.5 times the national average in the San Francisco metropolitan area and more than three times the national average in the San Jose metropolitan area.

Figure 14

Housing Affordability 1950-2012

LARGEST U.S. METROPOLITAN AREAS: MEDIAN MULTIPLE



1950–1970: From Census Bureau; 1980–2009: From Harvard University; 2010–2012: From Demographia. Annual Data Begins at 1980

The Impact of Urban Containment Policy on Housing Affordability

A considerable body of evidence indicates that land use policies that severely ration land for development can retard housing affordability. This is consistent with the principle of economics that rationing any good or service leads to artificially higher prices:[66]

> *When the supply of any commodity is restricted, the commodity's price rises. To the extent that land-use, building codes, housing finance, or any other type of regulation is binding, it will worsen housing affordability.*[67]

These "urban containment" policies include severe restrictions on the development of residential land, such as urban growth boundaries, development moratoria, and quotas that limit the number of houses that can be built. The Bay Area has strong urban containment policies.[68]

Measuring Housing Affordability

One of the most frequently used measures of housing affordability is the "median multiple," which is the median house price divided by the median household income.[69] Generally, the median multiple in major metropolitan areas of the United States has been at 3.0 or below since World War II.[70] This has also been the case, at least until less than two decades ago in Australia, Canada, Ireland, New Zealand and the United Kingdom. In

Land and House Construction Costs

The principal difference in the cost of housing relative to household incomes around the country is the cost of land.

For example, housing construction costs in the San Francisco and San Jose metropolitan areas are 40 percent to 50 percent above those in the Dallas-Fort Worth metropolitan area.[76] Yet the San Francisco metropolitan area median house price was 240 percent higher than in Dallas-Fort Worth in 2012, while the San Jose metropolitan area price was 300 percent higher. During the housing bubble, house prices peaked at 450 percent higher in the San Francisco and San Jose metropolitan areas than in Dallas-Fort Worth. The overwhelming share of the difference is in the land prices, which are driven up by the rationing effect of urban containment policy.

Further, the higher prices are not the result of higher demand. The most important measure of underlying housing demand, domestic migration, has been much greater in Dallas-Fort Worth than in the Bay Area. Between 2000 and 2012, a net 415,000 domestic migrants moved to Dallas-Fort Worth, while a net 580,000 were leaving the San Francisco and San Jose metropolitan areas.[77]

Moreover, there may be a perception that land costs are reduced by the smaller lot sizes that are imposed by urban containment policy. This represents a fundamental misunderstanding of economics, in general, and land markets in particular. Neither land nor any other good or service has an "inherent" value in the market. Prices are established through the interaction of supply and demand, and precise changes in price are not easily susceptible to reliable prediction, even by economic formulas. Smaller building lots have led to substantially *higher* land prices per new dwelling where urban containment policy has been adopted.[78]

Finally, agricultural land costs in the Bay Area are little above those of the nation. In the San Francisco metropolitan area, the 2007 *Census of Agriculture* indicated an average value per acre of $5,500 for agricultural land. In the San Jose metropolitan area, the figure was $3,800. By comparison, the national average value per agricultural land acre in the major metropolitan areas was $4,100.[79] The underlying value of land in a properly functioning land market would not be materially more expensive in the Bay Area.

fact, none of the major markets without urban containment policy reached a median multiple of 4.5, even during the housing bubble.[71]

A few California markets, including in the Bay Area, reached median multiples of 10.0 or above during the housing boom. Indeed, three quarters of the house value losses preceding the start of the Great Financial crisis with the Lehman Brothers bankruptcy occurred in just 11 metropolitan markets, which included both San Francisco and San Jose. Each of these 11 markets had urban containment policies or other severe land rationing policies.[72]

Land and Housing Affordability

Rising house prices relative to household incomes can be an indication of an insufficient, affordable land supply.[73] Economist Anthony Downs of the Brookings Institution stresses the importance of a "competitive land supply" to housing affordability. The principal cost element in the loss of housing affordability from urban containment policy is higher land costs (see sidebar). Downs describes the process by which urban growth boundaries can drive up the price of land, which increases house prices.[74]

> *If a locality limits to certain sites the land that can be developed within a given period, it confers a preferred market position on those sites. . . . If the limitation is stringent enough, it may also confer a monopolistic power on the owners of those sites, permitting them to raising land prices substantially.*

Even comparatively modest house price differentials can have a significant effect on a community and its inhabitants. Downs notes that a modest 10 percent increase in house prices makes it impossible for four percent of households to purchase a home, and concludes that such an effect is "socially significant."[75]

How Housing Affordability was Lost in California

Recent house price increases have re-opened a gap between Bay Area house prices and average major metropolitan area house prices that nearly equals the difference that existed at the peak of the housing bubble.

Stronger land use regulation was implemented in California in the 1970s through court decisions and administrative actions. The Bay Area was a leader in the implementation of these policies.

William Fischel of Dartmouth University notes that until 1970, California house prices were similar to those in the rest of the nation.[80] Fischel indicates that in 1970, California median house prices relative to median family incomes were 29 percent higher than in the rest of the nation. By the end of the decade, California house prices had escalated to more than 75 percent higher in relation to incomes than in the rest of the nation and by 1990 the difference had expanded to approximately 120 percent.

Fischel looks at potential causes for the divergence of California house prices from those in the rest of the nation.

- There was little difference in the trend of construction costs between California and the nation and notes that the housing price "explosion" is not "explained at all by construction costs."
- The most important factors that might be expected to increase the house prices were not present, such as substantially greater increases in incomes or large increases in population growth rates.
- The quality of life in California is perceived to be better than in much of the rest of the nation, yet Fischel finds no evidence that the California advantage had expanded during the 1970s, when the house price difference expanded. He suggests that it would have been more likely to expect the large increases to have occurred before 1970, when, according to Fischel, the amenity differential between California and the rest of the nation was greater.

Fischel also notes that land for development is plentiful, eliminating the scarcity of land as a factor that could have driven house prices upward.

Research on Urban Containment and Rising House Prices

Economic research also identifies slower than expected economic growth in metropolitan areas with urban containment policy. Urban containment policy has been associated with higher commercial development costs[81] and higher retail prices,[82]

Urban Containment and Speculation

It is an economic principle that buyers will tend to be attracted to markets in which investment gains appear to be most lucrative. It is thus not surprising that urban containment is associated with speculation (attracting investors). [83]

Recent house price increases have re-opened a gap between Bay Area house prices and average major metropolitan area house prices that nearly equals the difference that existed at the peak of the housing bubble. At least part of this may be due to the increased involvement of foreign investors in the Bay Area housing market.[84] In this regard, an important principal driving force may be the housing restrictions that have been imposed by the People's Republic of China in an attempt to control its runaway price increases. This is reported to have induced an increase in California housing investment from China.[85] This influx of a new tranche of buyers, along with other investors attracted by the bullish Bay Area market and often pay cash,[86] as well with the serious restriction on single-family housing construction in the Bay Area could signal even further house price increases.

Urban Containment and Domestic Migration

During the 2000 to 2010 decade, the Bay Area experienced significant net domestic outmigration. On average, the Bay Area lost approximately 65,000 net domestic migrants each year.[87] Between 2010 and 2012 there was a turnaround, with approximately 6,000 net domestic migrants added annually. Nationally, net domestic migration losses were strongly centered in more costly major metropolitan markets between 2000 and 2009, while less costly major metropolitan markets captured a substantial net domestic migration gain.[88]

Domestic outmigration could recur and increase substantially if housing affordability is not materially improved. Even if job growth is greater, new employees might be forced or choose to live in the San Joaquin Valley where housing costs are considerably lower. This could work against the GHG emissions reduction objectives of Plan Bay Area.

Urban Containment: Hobbling Economic Growth

There is also research pointing to urban containment policy as inhibiting economic growth. U.S. Federal Reserve Board economist Raven Saks found that employment growth is 20 percent less than expected in U.S. metropolitan areas with stronger land use policies.[89] Another econometric analysis found an association between more restrictive land use regulation and slower economic growth in the Randstadt region (Amsterdam-Rotterdam-The Hague).[90]

After the collapse of the housing market, the U.S. Congress commissioned a report on the causes of the financial crisis. The U.S. Financial Crisis Inquiry Commission identified four hypotheses as possible causes for the U.S. housing bubble. One of the hypotheses involved strong land use restrictions. The commission stated:

> *Land use restrictions. In some areas, local zoning rules and other land use restrictions, as well as natural barriers to building, made it hard to build new houses to meet increased demand resulting from population growth. When supply is constrained and demand increases, prices go up.*[91]

There is considerable additional research on the strong relationship between urban containment policy and the loss of housing affordability. For example, Paul Cheshire of the London School of Economics has concluded that *urban containment policy is incompatible with housing affordability*.[92] Other research also concludes that urban containment policy can hamper broader economic performance.[93]

Impact of Plan Bay Area on Rental Costs and Workforce Housing

The housing affordability problem extends to rental costs as well. California's median monthly housing costs were 40 percent above the national average in 2011. In 2012, San Jose, had the highest overall median housing costs among the nation's major metropolitan areas, at 78 percent above average.[94] San Francisco had the third highest housing cost, at 68 percent above the national average.

The extent of the housing affordability problem for "working families" in the Bay Area is detailed in an Urban Land Institute report (*Priced Out*).[95]

- In 2009, every Bay Area county ranked among the 15 percent least affordable, despite the fact that house prices had dropped "40 percent or more" from the 2006 peak.

- "Uniformly high housing costs are similarly pervasive in the rental housing market."

- "A disproportionately high percentage of workforce households also pay more than 30 percent of their incomes on rent, more than in peer metropolitan regions across the country."

The Bay Area's housing affordability has become so severe, that households have been locating in the San Joaquin Valley to obtain more affordable housing.[96]

Impact of Plan Bay Area on Overall Housing Affordability and Commercial Real Estate

Plan Bay Area's housing policies seem likely to *worsen* the Bay Area's already worst in the nation housing affordability and make its commercial real estate more costly. Nearly all new housing (97 percent) would be in the existing urban footprint, with little potential for new housing on the fringe. This would preclude the use of less costly land.

Two other measures in Plan Bay Area could raise land and housing costs even above their presently elevated levels.

- The first measure would ration land even more severely, within, rather than beyond the urban footprint. Plan Bay Area would also limit where new development could occur principally in the PDAs. This further rationing of land would likely lead to a further deterioration of housing affordability.

- Further, by seeking to concentrate new employment locations in the PDAs, Plan Bay Area could further raise commercial land prices, which would make the cost of doing business in the Bay Area greater and lead to higher service and product prices.

Priced Out expresses a similar concern with respect to rental housing:

> *Unless serious changes are made, future construction will not alleviate the problem. A scarcity of appropriately zoned and located land together with relatively high development costs makes it nearly impossible for builders and developers to deliver high-quality new rental communities at price points affordable to workforce families.*

The DEIR does not examine the negative effect of its policies, including urban containment policy, on housing affordability

It will not be possible to restore housing affordability in the Bay Area, either for low-income households or other households, without restoring a competitive land supply (Box 2). The continuing and substantial disparity between the Bay Area's cost of living, much due to its inferior housing affordability, will make it less competitive relative to other metropolitan areas. This further implies that the aggressive population growth assumptions of Plan Bay Area are implausible.

Housing Affordability Recommendation

The Plan Bay Area does not include an alternative that would achieve a competitive land supply. As a result, its strategies cannot restore housing affordability. A replacement Plan Bay Area should include an alternative that restores a competitive land supply.

New Housing and Land Availability

Urban containment policy, on which Plan Bay Area is largely intended is to limit urban sprawl. Urban sprawl is a generally ill-defined term[97] that has been applied to urbanization from the lowest densities to the highest in the world.[98]

Yet, there is no shortage of land for development. For example, much urban development has taken place on agricultural land, yet improving productivity has resulted in substantial increases in production around the nation. An area larger than Texas and Oklahoma combined has been taken out of production since 1950 in the United States, far more land that has been required by new urbanization. In California, approximately four times as much land has been taken out of agricultural production since 1950 as has been used for new urbanization. Agricultural land reductions have not been the result of urbanization.[99]

The entire extent of urbanization in the Bay Area is approximately 1,238 square miles. The total agricultural land in the Bay Area is approximately 3,369 square miles, three times the total land covered by urbanization.[100]

At the same time, urban containment policies have largely been adopted without a full discussion or disclosure of the negative externalities, such as higher housing costs, as well as their impact on households, whether above or below the poverty line.

6. LOW-INCOME HOUSEHOLDS

Housing

Plan Bay Area fails to materially improve the already difficult challenges to low-income households. The high cost of living in the Bay Area is particularly burdensome for low-income households. Current poverty measures underestimate the seriousness of the problem. The poverty threshold is not adjusted for the cost of living. As a result, poverty estimates in high cost of living areas, such as the Bay Area, tend to underestimate the number of people and households below the poverty line.

In recognition of this difficulty, the Bureau of the Census has published alternative poverty measures that take into consideration the difference in housing costs. At this point, only state data are available. California's conventional poverty rate was 16.3 percent in 2009-2011. However, when adjusted for differences in housing costs, California's poverty rate rose to 23.5 percent, the highest among the states as well as the District of Columbia.[101]

California's median monthly housing costs were 40 percent above the national average in 2011, well below the differentials in San Jose (78 percent above average) and San Francisco (68 percent).[102] California's poverty rate could be even higher, at perhaps one-half or more higher than published rates.[103]

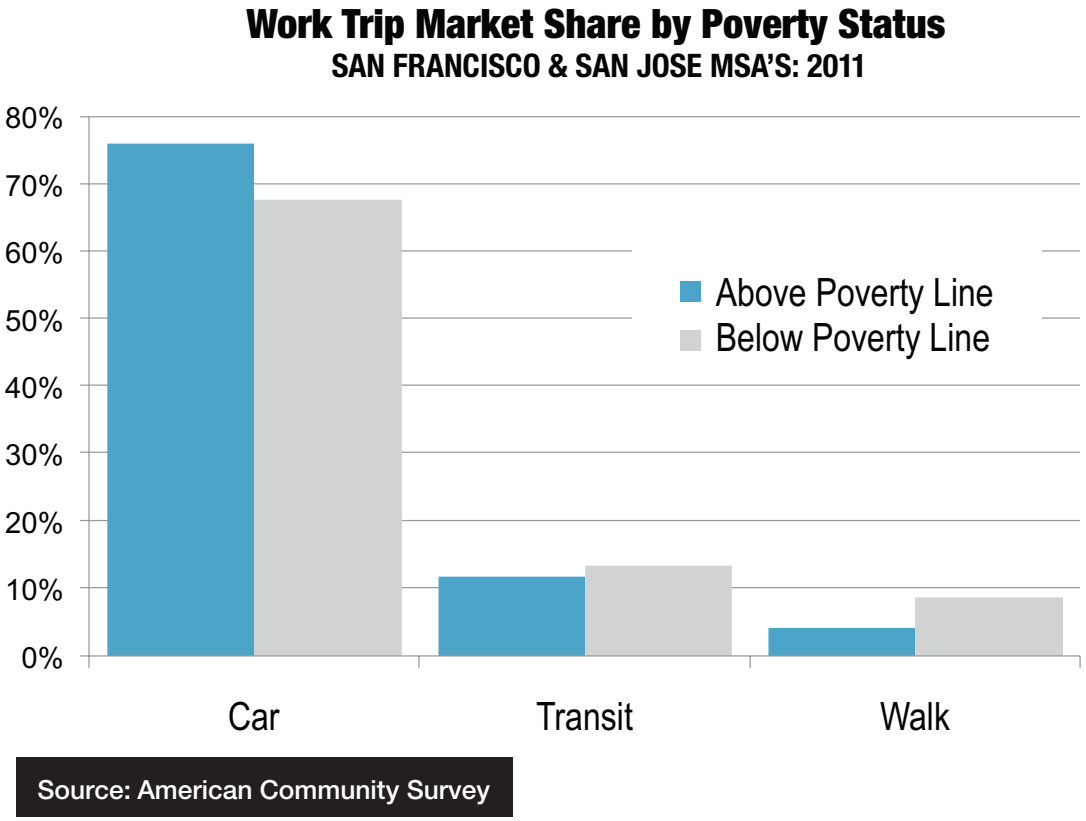
Plan Bay Area examines housing affordability for low income residents, however, it does not consider strategies that could address the fundamental driver of the high prices: higher land prices that result from public land rationing policies (urban containment). Genuine housing affordability would require easing of land use restrictions on the urban fringe.

As indicated in Section 5, a replacement Plan Bay Area should include an alternative to restore a competitive land supply, and thus housing affordability.

Mobility and Employment

It is generally understood that transit is used more by low-income citizens than by others. Even so, the overwhelming majority of commuting by low income households is by passenger vehicle, not transit. This is because transit cannot provide sufficient mobility throughout the Bay Area (Figure 15). As is indicated in Section 4, the average worker in the Bay Area can reach only 10 percent of jobs on transit in 45 minutes, which is an excessive amount of commuting time. The limited access provided by automobile competitive transit forces many low income workers to purchase cars.

Figure 15



Source: American Community Survey

An MTC local report expresses the problem: "Low-income people face a choice of commuting long distances to access better jobs, or taking lower paying work nearer to home."[104] Further, it is clear from the small increase in transit commuting projected by Plan Bay Area that transit will not materially improve mobility, either for low-income citizens or others.

Yet, mobility throughout the labor market is important to taking advantage of better employment opportunities, especially for low-income workers. This requires an automobile. As a Progressive Policy Institute report put it:[105]

> *In most cases, the shortest distance between a poor person and a job is along a line driven in a car. Prosperity in America has always been strongly related to mobility and poor people work hard for access to opportunities. For both the rural and inner-city poor, access means being able to reach the prosperous suburbs of our booming metropolitan economies, and mobility means having the private automobile necessary for the trip. The most important response to the policy challenge of job access for those leaving welfare is the continued and expanded use of cars by low-income workers.*

Plan Bay Area does not consider alternatives that could materially improve mobility for low income residents. For example, considerable favorable attention has been given to car sharing programs, which permit better personal mobility without the necessity of car ownership. These programs have a strong presence in the Bay Area. Further, user subsidies to support automobile ownership may have some potential for improving low income mobility. There may be other strategies by which access to employment opportunities can be expanded cost-effectively for low-income citizens. One such strategy could be incentives to increase working at home, which is obviously the most sustainable mode of work access. Neither car sharing nor user subsidies were considered in Plan Bay Area. It is possible that some funding currently directed to low income household mobility could be more effectively used in such strategies.

It is also important to understand that Plan Bay Area does not anticipate providing effective transit mobility throughout the area for low-income households who do not have cars. Nor is the Bay Area capable of such a response. Because of its high costs, effective transit access can only be provided for some with destinations downtown and some in the densest sectors of the urban core.[106] Achievement of usable region wide transit mobility has not been achieved in any major metropolitan area, nor has it even been seriously proposed (probably due to its prohibitive cost).

Low Income Household Recommendation

A replacement Plan Bay Area should consider alternatives that could materially improve employment mobility and travel times for low-income citizens to the great majority of jobs that cannot be accessed or require excessive travel time by transit.

7. CONCLUSION: REPLACING THE UNNCESSARY AND DISRUPTIVE PLAN BAY AREA

Plan Bay Area forecasts only modest gains in the preferred "2040 Plan" in GHG emissions reductions relative to the "2040 No Project Alternative," which comfortably meets the emissions reduction objective. In exchange for these small gains, Plan Bay Area imposes draconian measures to force residences and businesses into small, high density areas. Further, these miniscule gains are not subjected to an economic test.

Plan Bay Area would interfere with the housing choices of households in an unprecedented, and *unnecessary* manner. At the same time, a number of assumptions are excluded from Plan Bay Area or are challengeable. The correction of these potential deficiencies would result in much more steep reductions in GHG emissions.

Yet, the business as usual (or "null") alternative, the "2040 No Project Alternative" meets the objective set by the California Air Resources Board. There is no need for the "2040 Plan" and the excessive intrusion of Plan Bay Area could lead to lower levels of economic growth as well as greater community and household disruption.

In its plans to strengthen housing regulation and failure to provide transportation capacity to facilitate improved mobility, Plan Bay Area makes inherent choices that are not apparent in its analysis. The higher costs of housing result in choosing the unnecessary preservation of a relatively small area of land in exchange for a less affluent future (due to higher house prices) for all households in the area, but most especially lower income households. By not facilitating greater mobility, Plan Bay Area opts for a future of less employment access, which also retards household affluence.

In addition to working against the economic interests of all households and lower income households, the policies also disadvantage younger households. These choices are not addressed in Plan Bay Area and have been largely ignored in decisions on similar policies in the past throughout the Bay Area.

A Replacement Plan Bay Area

Plan Bay Area should be withdrawn and replaced by a plan using the most current assumptions and in recognition of the projected progress in GHG emissions reductions.[107]

The Purpose of Cities: Throughout history, cities (metropolitan areas), including the Bay Area have attracted people seeking economic advancement. As former principal planner Alain Bertaud put it:

The raison d'être of large cities is the increasing return to scale inherent to large labor markets. [108] A replacement Plan Bay Area should focus on strategies that respond to the reasons that people have chosen to move there: improving their quality of life. This is best measured by the extent of discretionary income, the most important determinant of which is housing affordability. Further, a replacement Plan Bay Area should focus on eradicating poverty, which requires that the overall cost of living (and housing, its most important element) not be increased by public policy.

Equality of opportunity should drive the housing element of a replacement Plan Bay Area. Households should not be required by public policy (such as urban containment) to pay a higher than necessary share of their income for housing. Such policies are harmful to households because they retard their affluence (by reducing their discretionary incomes). They are particularly harmful to younger households who often must leave the Bay Area to achieve and enjoy their preferred quality of life.

Cost effective policies are imperative because of the substantially deteriorated financial condition of the nation and California. Factors such as unaffordable government employee pension obligations, rising taxes, and huge student loan burdens are already constraining discretionary income and its growth.

In particular, a replacement Plan Bay Area should:

- Include an alternative that restores a competitive land supply and thus housing affordability.
- Exclude housing location or type mandates or guidelines.
- Establish objectives to materially reduce traffic congestion and prioritize government funding for transportation principally using the cost per reduced delay per hour (favoring less costly initiatives that maximize economic growth, as described in Section 4).
- Include the further GHG emissions reduction effect of the Department of Energy projections.
- Apply the same MTC Climate Policy Initiative GHG emissions reductions to the 2010 No Project alternative as is assumed for the "2040 Plan" (or it should be amended to clearly justify the differing figures).
- Include GHG emissions from common energy consumption in multi-unit buildings.
- Assume a higher multi-unit house size to reflect changes that would occur with a larger share of purchasers.
- Assume California Department of Finance DOF official population forecasts. This would be the present DOF population projection, unless DOF revises its official county projections *throughout the state* to reflect revised methodology.
- Include an economic analysis of each strategy and exclude any strategy that exceeds $50 per GHG ton reduced.
- Consider alternatives that could cost effectively and materially improve employment mobility and travel times for low income citizens to the great majority of jobs that cannot be accessed or require excessive travel time by transit.[109]

Endnotes

1 The Bay Area Plan includes nine counties, Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano and Sonoma. These nine counties comprise the San Francisco, San Jose, Santa Rosa, Napa and Vallejo metropolitan areas (San Benito County, in the San Jose metropolitan area is not covered by the Bay Area Plan).

2 Emilia Istrate and Carey Ann Nadeau, *Global Metro Monitor 2012: Slowdown, Recovery, and Interdependence,* The Brookings Institution, 2012, http://www.brookings.edu/~/media/research/files/reports/2012/11/30-global-metro-monitor/30-global-monitor.pdf.

3 A metropolitan area is a labor market.

4 San Jose is the most costly and San Francisco is the second most costly.

5 Income after taxes and paying for necessities, such as housing, food, clothing and transportation.

6 Also called "smart growth," "growth management," "compact cities policy," "densification," etc.).

7 Metropolitan Transportation Commission, "Air Resources Board Adopts Greenhouse Gas Reduction Targets, September 23, 2010, http://www.mtc.ca.gov/news/current_topics/9-10/arb.htm.

8 Calculated from data in the Draft Environmental Impact Report (DEIR).

9 This is contrary to the popular notion that emissions will continue to climb regardless of improvements in fuel economy.

10 U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook: 2013,* http://www.eia.gov/forecasts/aeo/.

11 Calculated from *Annual Energy Outlook 2013*.

12 There could be much greater fuel economy (and GHG emissions reduction) improvements in the future. For example, two automobile manufacturers (Volkswagen and Audi) could soon be selling cars (two separate designs) that achieve 260 and 235 miles per gallon respectively (a more than 300 percent improvement on the new federal fuel economy standard. See: http://www.greencarreports.com/news/1054259_volkswagen-says-it-will-build-2-seat-260-mpg-plug-in-hybrid and http://www.greencarreports.com/news/1080653_audi-plans-200-mpg-plus-high-tech-small-car

13 *Draft Summary of Predicted Traveler Responses*, ABAG and MTC (March 2013), http://onebayarea.org/pdf/Draft_Plan_Bay_Area/Draft_PBA_Summary_of_Predicted_Traveler_Responses.pdf

14 California Energy Commission, *California Energy Saturation Study* (2009). http://www.energy.ca.gov/appliances/rass/

15 Paul Myors. *Energy Australia.* Rachel O'Leary & Rob Helstroom, *Multi-unit Residential Buildings Energy & Peak Demand Study,* http://203.15.106.215/information/common/pdf/alts_adds_req/energy_mu_study.pdf.

16 ABAG and California Department of Finance, "Overview of the Regional Housing Need Determination, DOF Population Projections and Plan Bay Area Forecast," undated.

17 The ABAG website indicates that the DOF population projection "is not a forecast of the most likely outcome." (http://onebayarea.org/about/faq.html#q10045). As of April 20, there was no indication on the DOF website a withdrawal of their population projections, nor any indication that the projections were being redone statewide in a manner consistent with the ABAG methodology.

18 Further, even before deferring to ABAG on population projection methodology, DOF's method of projecting population increase may be skewed high. This is illustrated by recent experience. In 2007, the Department of Finance projected a Bay Area that was 2.6 percent higher than the count

just three years later in the 2010 census. There were similar over projections in other parts of the state and statewide as well. The author called these population projections into question at the time. See: Wendell Cox, "60 Million: Don't Bet on It: Cost of housing will put a lid on how much state's population can grow," *The Orange County Register,* August 24, 2007. http://www.ocregister.com/opinion/growth-23157-county-san.html

19 For example, Harvard economist Benjamin Friedman found from an historical analysis that economies that fail to grow tend to lapse into instability. Friedman, B. M. (2005), *The Moral Consequences of Economic Growth,* Alfred A. Knofp.

20 Office of Tony Blair and The Climate Group (2008), *Breaking the Climate Deadlock A Global Deal for Our Low-Carbon Future: Executive Summary.*

21 The United States Environmental Protection Agency forecasts that the fuel economy improvements to 2040 will be accomplished without increasing consumer costs, because the fuel savings would be greater than the cost of the regulation. This would produce GHG emission reductions per ton at well below the $20-$50 range cited by the IPCC.

22 The basis of this objective is a 2005 executive order by Governor Schwarzenegger (Executive Order S-3-05). In addition, a 2012 Executive Order by Governor Brown (Executive Order B-16-2012) calls for an 80 percent reduction from 1990 levels for 2050, which applies to transportation. Each of these executive orders goes beyond the requirements of AB32 and SB375, neither of which contains such an objective. Moreover, Governor Brown's 80 percent target is beyond the expectations of the IPCC, which estimated the potential for GHG reductions from transportation at less than one-half its contribution to emissions. Consistent with the IPCC research, The European Conference of Ministers of Transport acknowledged a lesser potential for transportation, indicating that "Transport and other sectors are ... expected to contribute correspondingly less to overall emissions reduction strategies (European Council of Ministers of Transport, *Transport and Environment: Review of CO2 Abatement Policies for the Transport Sector Conclusions and Recommendations*, p.3, 2006)

23 Transportation is a large contributor to GHG emissions, estimated at 23 percent of the world GHG emissions, 75 percent of which is from road vehicles (IPCC 2007b, 325). IPCC further estimated the potential for GHG reductions from transportation at between 8 and 10 percent, assuming a cost of less than $100 per ton (IPCC 2007a, 11) and based upon a total CO2 equivalent GHG emission of from 16.1 gigatons to 31.1 gigatons in 2050 (IPCC 2007c, 632).

24 European Council of Ministers of Transport, *Transport and Environment: Review of CO2 Abatement Policies for the Transport Sector Conclusions and Recommendations*, p.3, 2006.

25 Wendell Cox, "California Declares War on Suburbia: The Cost of Radical Densification" *The New Geography*, April 18, 2012, http://www.newgeography.com/content/002781-california-declares-war-suburbia-ii-the-cost-radical-densification.

26 Plan Bay Area, "Plan Bay Area Preferred Land Use Scenario/Transportation Investment Strategy," http://apps.mtc.ca.gov/meeting_packet_documents/agenda_1875/Item_4a_Pref._Land_Use_Scenario_Transp._Invest._Strategy.pdf

27 In another report we have estimated the cost per ton of GHG emission removed at $20,000 for a national implementation of urban containment policy. See: Wendell Cox, "Reducing Greenhouse Gases from Personal Mobility: Opportunities and Possibilities," Reason Foundation, 2011, http://reason.org/files/reducing_greenhouse_gases_mobility_development.pdf.

28 EIS, page ES-3.

29 A localized jobs/housing balance applies to a part of a labor market (metropolitan area), rather than to the overall labor market.

30 Based on the difference in the passenger vehicles GHG emissions between the "2040 Plan" and the 2040 No Plan alternative in Table 3.1-29.

31 R. Ewing & R. Cervero, "Travel and the Built Environment," *Journal of the American Planning Association,* Volume 76, Issue 3, 2010.

32 *Southeast England New Towns Commuting Distance and Urban Area Geographical Size,* http://www.demographia.com/db-seuknewtowns.htm.

33 Peter Hall, *Cities in Civilization* (New York, NY: Pantheon Books, year), pp. 842–887.

34 http://demographia.com/db-worldua.pdf. At 65,000 per square mile (nearly four times that of the city of San Francisco), nearly all of the population of the 9-county Bay Area could fit within the municipal boundaries of San Francisco and Oakland.

35 Wendell Cox, "Hong Kong's Decentralizing Commuting Patterns" *The New Geography*, December 12, 2012, http://www.newgeography.com/content/003300-hong-kong-s-decentralizing-commuting-patterns

36 The Bay Area also has a substantially more rapid average one way work trip travel time, at 27.5 minutes (25.9 minutes including people who work at home), compared to Hong Kong at 46 minutes, which is one of the longest travel times in the high-income world. Bay Area data calculated from 2011 American Community Survey.

37 Calculated from 2011 Hong Kong census, excludes working at home.

38 Includes incorporated municipalities and census designated places from 13 to 45 square miles. This excludes the jobs rich markets of the municipalities of San Francisco and Oakland, which are larger than 45 square miles.

39 For additional discussion, see: P. Gordon, "Spontaneous Cities" For additional discussion, see in D. E. Andersson (ed.) *The Spatial Market Process*, Emerald Group Publishing Ltd, 2012.

40 Alain Bertaud, "The Spatial Organization of Cities: Deliberate Outcome or Unforeseen Consequence?" eScholarship, University of California, http://www.escholarship.org/uc/item/5vb4w9wb.

41 Wendell Cox, "Traffic Congestion, Time, Money & Productivity," *The New Geography,* September 18, 2009, http://www.newgeography.com/content/001044-traffic-congestion-time-money-productivity.

42 R. Prud'homme, & Lee, C., "Size, Sprawl, Speed, and the Efficiency of Cities," Obervatoire de l'Économic et des Institutions Locals, 1998, D. T. Hartgen & Gregory Fields, "Accessibility, Traffic Congestion and Regional Economic Performance," Reason Foundation, http://reason.org/news/show/gridlock-and-growth-the-effect, 2009 and R. Cervero, "Efficient Urbanization: Economic Performance and the Shape of the Metropolis," Lincoln Institute of Land Policy Working Paper, http://www.lincolninst.edu/pubs/88_Efficient-Urbanization, 2000. This relationship exists within the metropolitan area, all things being equal, but does not necessarily predict differences in economic performance between metropolitan areas.

43 Reid Ewing and Robert Cervero, "Travel and the Built Environment: A Meta-Analysis," *Journal of the American Planning Association,* May 2010, http://www.reconnectingamerica.org/resource-center/browse-research/2010/travel-and-the-built-environment-a-meta-analysis

44 Wendell Cox, "Urban Travel and Urban Population Density," *Journeys,* November 2012, Land Transport Authority, Singapore Government, http://ltaacademy.gov.sg/doc/JOURNEYS_Nov%202012.pdf.

45 Tom Tom Congestion Index, http://www.tomtom.com/en_gb/congestionindex/.

46 Inrix Traffic Scorecard, http://scorecard.inrix.com/scorecard/.

47 Wendell Cox, "New US Urban Area Data Released," *The New Geography*, March 26, 2012, http://www.newgeography.com/content/002747-new-us-urban-area-data-released.

48 Transport Canada, *The Cost of Urban Congestion in Canada,* 2007, http://citeseerx.ist.psu.edu/viewdoc/ionid=9CD2D9FA6D7AE54580D380138C052FED?doi=10.1.1.134.6880&rep=rep1&type=pdf

49 Wendell Cox, "Smart Growth (Livability), Air Pollution and Public Health," *The New Geography*, September 29, 2011, http://www.newgeography.com/content/002462-smart-growth-livability-air-pollution-and-public-health

50 There is also a projected modest increase in walking and cycling, the effect of which is included in the 2 percent difference between Plan Bay Area and the "2040 No Project Alternative". Draft DEIR Table 2.1-13

51 Wendell Cox, "Transit Policy in an Era of the Shrinking Federal Dollar," *The Heritage Foundation,* 2013, http://thf_media.s3.amazonaws.com/2013/pdf/bg2763.pdf.

52 Calculated from MTC, "SCS Jobs Housing Connection Scenario Distribution Spreadsheet" (undated, accessed June 2012)

53 Martin Turcotte, "Life in Metropolitan Areas: Dependence on Cars in Urban Neighbourhoods." *Canadian Social Trends*, Statistics Canada." http://www.statcan.gc.ca/pub/11-008-x/2008001/article/10503-eng.pdf.

54 McCloskly, D., Birrell, R., & Yip, R. (2009), "Making Public Transport Work in Melbourne," *People and Place,* September.

55 "San Francisco Bay Area CBD & Urban Area Commuting Profile: 2000," *Urban Transit Fact Book,* http://publicpurpose.com/ut-cprof-sf.htm.

56 A. Tomer, A, E. Kneebone, A. Berube, & R. Puentes, R., "Missed Opportunity: Transit and Jobs in Metropolitan America," Brookings Institution (2011).

57 The Bay Area combined statistical area (San Jose-San Francisco). Data from the American Community Survey 2011 (1 year).

58 Calculated from American Community Survey data.

59 All transit travel, both work trips and other trips.

60 Analysis of National Transit Database, 1985 and 2010.

61 Measured in "boardings." A boarding occurs each time a passenger gets on a vehicle. Thus, a door to door trip using two buses counts as two boardings, even though it is only one trip (called a "linked trip").

62 Calculated from *C2ER Cost of Living Index: Annual 2012*. Indexes for Oakland and San Francisco metropolitan divisions and San Jose metropolitan area weighted by population (San Benito County included because it is included in the San Jose data. Because of San Benito County's smaller population, this is unlikely to materially impact the calculation). The *C2ER Cost of Living Index* is the most frequently consulted cost of living index, and was formerly called the *ACCRA Cost of Living Index.* http://www.coli.org/.

63 Groceries are also more expensive in the Bay Area, at more than 20 percent above the national average. Calculated from *C2ER Cost of Living Index: Annual 2012.* http://www.coli.org/.

64 Calculated from *C2ER Cost of Living Index: Annual 2012,* as noted above. http://www.coli.org/.

65 National Association of Realtors, *Metro Area Home Price Growth Trend Continues in First Quarter*, May 9, 2013, http://www.realtor.org/news-releases/2013/05/metro-area-home-price-growth-trend-continues-in-first-quarter.

66 A well known example of such a relationship is the gas price increases that follow imposition of quotas or embargoes on oil production, as occurred especially in the 1970s.

67 R. K Green and S. Malpezzi (2003), *A Primer on U.S. Housing Markets and Housing Policy,* Urban Institute Press, p. 146.

68 DEIR, Table 2.3-14.

69 The Median Multiple is widely used for evaluating urban markets, and has been recommended by the World Bank and the United Nations and is used by the Harvard University Joint Center on Housing. See: Wendell Cox and Hugh Pavletich, *9th Annual Demographia International Housing Affordability Survey,* p.6, 2013, http://www.demographia.com/dhi.pdf.

70 Reserve Bank of Australia, see Wendell Cox and Hugh Pavletich, *9th Annual Demographia International Housing Affordability Survey,* p. 20, 2013, http://www.demographia.com/dhi.pdf.

71 Wendell Cox and Hugh Pavletich, *9th Annual Demographia International Housing Affordability Survey,* 2013, http://www.demographia.com/dhi.pdf

72 These included all major six metropolitan markets in California (Los Angeles, San Francisco, Riverside-San Bernardino, San Diego, Sacramento, and San Jose).

73 In the Portland area, virtually across the road raw land values per acre at the urban growth boundary average 11 times higher within the boundary than outside the boundary (see: Wendell Cox, "Property Values 11 Times Higher Across Portland's Urban Growth Boundary," *The New Geography*, October 12, 2010, http://www.newgeography.com/content/001808-property-values-11-times-higher-across-portlands-urban-growth-boundary and Gerald Mildner, *Public Policy and Portland's Real Estate Market*, 2009, http://www.pdx.edu/sites/www.pdx.edu.realestate/files/media_assets/quarterly_report/2010_1st/1Q10-4A-Mildner-UGB-1-31-10.pdf)

74 Anthony Downs (1994), *New Visions for Metropolitan America,* Brookings Institution Press and Lincoln Land Institute, p. 38. newvison.aspx, p. 38

75 Downs, p. 36.

76 Average of locations from *R. S. Means Residential Square Foot Costs: 2010 Contractors Pricing Guide,* R. S. Means.

77 Calculated from U.S. Census Bureau data (data for 2000-2009, and 2010-2012. No data are available for 2010).

78 http://demographia.com/dri-full.pdf.

79 Calculated from U.S. Census of Agriculture, 2007.

80 William Fischel, *Regulatory Takings, Law, Economics and Politics,* Harvard University Press, 1995, p. 218-225.

81 P. C. Cheshire, & C. Hilber (2008), Office Space Supply Restrictions in Britain: *The Political Economy of Market Revenge*, London School of Economics, http://www2.lse.ac.uk/geographyandenvironment/pdf/office percent20space percent20supply percent20restrictions percent20in percent20britain.pdf

82 B. Lewis, M. Ballek, C. Craig, V. Harris, B. Levi, H. Mullings, I. Osborne, S. Anthoy, D. Bugrov, J. Kondo, V. Palmade, J. Rames, S. Fidler, N. Lovegrove & M. Baily (1998), *Driving productivity and growth in the UK economy*, McKinsey Global Institute, http://www.mckinsey.com/insights/mgi/research/productivity_competitiveness_and_growth/driving_productivity_and_growth_in_the_uk_economy

83 E. L. Glaeser & J. Gyourko (2008), *Rethinking Federal Housing Policy: How to Make Housing Plentiful and Affordable,* American Enterprise Institute, 2008.

84 Andrew Taylor, "The New Wave of Chinese Buyers," *The Real Estate Professional,* http://www.car.org/3550/pdf/econpdfs/2012_Annual_Housing_Market_Survey_Report_Final.pdf, accessed April 19, 2013.

85 Alex Finkelstein, "Chinese Buyers Boosting California's Housing Market," *World Property Channel,* December 27, 2012, http://www.worldpropertychannel.com/north-america-residential-news/chinese-real-estate-investors-california-association-of-realtors-ritz-carlton-los-angeles-national-association-of-realtors-nar-chinese-property-buyers-report-6400.php.

86 California Association of Realtors, *2012 Annual Housing Market Survey,* 2012, http://www.car.org/3550/pdf/econpdfs/2012_Annual_Housing_Market_Survey_Report_Final.pdf

87 Calculated from U.S. Census Bureau data for the combined San Francisco and San Jose metropolitan areas.

88 Wendell Cox, "Net Domestic Migration and Land Regulation by Severity of the Housing Bubble, Demographia.com, 2011, http://www.demographia.com/db-bubblehaff.pdf

89 R. E. Saks (2005), *Job Creation and Housing Construction: Constraints on Metropolitan Area Employment Growth,* Federal Reserve Board.

90 Vermeulen W. and J.Van Ommeren. Does land use planning shape regional economies? A simultaneous analysis of housing supply, internal migration and local employment growth in the Netherlands (2009), http://www.sciencedirect.com/science/article/pii/S1051137709000448.

91 U.S. Financial Crisis Inquiry Commission (2011) *Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States,* http://www.gpo.gov/fdsys/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf

92 Paul Cheshire, "Urban Containment, Housing Affordability, Price Stability-Irreconcilable Goals," 2009, http://www.sjcapitalgroup.com/publications/Urban percent20containment percent20housing percent20affordability percent20and percent20price percent20stability.pdf.

93 A compendium of research on the relationship between urban containment policy and higher house prices is available at http://demographia.com/db-dhi-econ.pdf

94 Further, the high cost of housing is not limited to the San Francisco and San Jose metropolitan areas. Other Bay Area Metropolitan areas are also costly. Napa ranks 11th most costly of the 374 Metropolitan areas for which there are data. Vallejo ranks 14th and Santa Rosa ranks 17th.

95 *Priced Out: Persistence of the Workforce Housing Gap in the San Francisco Bay Area*, Urban Land Institute, Terwilliger Center for Work Force Housing, 2009. http://www.rclco.com/archivepdf/Priced percent20Out percent20San percent20Fran percent20Report.pdf

96 *Priced Out: Persistence of the Workforce Housing Gap in the San Francisco Bay Area*, Urban Land Institute, Terwilliger Center for Work Force Housing, 2009. http://www.rclco.com/archivepdf/Priced percent20Out percent20San percent20Fran percent20Report.pdf

97 G. Galster, R. Hanson, M. R. Ratcliffe, H. Wolman, S. Coleman and J. Freihage, "Wrestling Sprawl to the Ground: Defining and Measuring an Elusive Concept," *Housing Policy Debate*, 2001.

98 Wendell Cox, "The Evolving Urban Form: Dhaka," *The New Geography,* August 8, 2012, http://www.newgeography.com/content/003004-evolving-urban-form-dhaka.

99 Calculated from U.S. Census Bureau and U.S. Department of Agriculture data.

100 DEIR.

101 K. Short, "The Research Supplemental Poverty Measure," *Current Population Reports,* U.S. Census Bureau, 2012, https://www.census.gov/hhes/povmeas/methodology/supplemental/research/Short_ResearchSPM2011.pdf

102 Calculated from the American Community Survey, 2011 (1 Year). Other Bay Area metropolitan areas ranked among the most costly for housing, including #11 Napa, #14 Vallejo and #17 Santa Rosa (out of more than 350 metropolitan areas).

103 The cost of groceries in the Bay Area is also above the national average (approximately 20 percent higher). Calculated from *C2ER Cost of Living Index.*

104 MTC, *San Francisco Bay Area Prosperity Plan,* http://bids.mtc.ca.gov/download/420.

105 M. Waller and M. A. Hughes, "Working Far From Home: Transportation and Welfare Reform in the Ten Big States," Progressive Policy Institute, 1999.. http://www.dlc.org/documents/far_from_home.pdf

106 Ziv, Jean-Claude and Wendell Cox. "Megacities and Affluence: Transport & Land Use Considerations" Presented to the World Conference on Transport Research. Berkeley, June 2007, http://www.publicpurpose.com/ut-wctrs2007.pdf.

107 In the marketplace, not as perceived by ABAG or MTC.

108 Alain Bertaud, "The Spatial Organization of Cities: Deliberate Outcome or Unforeseen Consequence?" eScholarship, University of California, http://www.escholarship.org/uc/item/5vb4w9wb.

About the Author

Wendell Cox

Wendell Cox is a PRI fellow and consultant to public and private public policy, planning and transportation organizations; and a visiting professor at a French national university. He is principal of Wendell Cox Consultancy (Demographia), an international public policy firm.

Mr. Cox was appointed by Mayor Tom Bradley to three terms on the Los Angeles County Transportation Commission, where he authored the tax amendment that provided the initial local funding for building light rail and subway system.

He was elected chairman of the American Public Transit Association Planning and Policy Committee (comprised of transit planning department officials) and the American Public Transit Association Governing Boards Committee (comprise of transit board members).

In 1999, he was appointed to the Amtrak Reform Council by the Speaker of the U.S. House of Representatives, to fill the unexpired term of New Jersey Governor Christine Todd Whitman.

Mr. Cox is a prolific writer and popular public speaker. He is the author of scores of monographs and book chapters addressing urban development and smart growth (urban containment), transportation, mass transit, congestion, demographic trends and the purpose of cities. He is co-author of the *Demographia International Housing Affordability Survey* (in its 9th edition), which covers 340 metropolitan areas in seven nations. He is also author of *Demographia World Urban Areas* (also in its 9th edition), the only publication in the world that provides current population, land area and urban density estimates for the more than 800 urban areas with 500,000 or more population. He writes a regular column in newgeography.com and is author of its *Evolving Urban Form* series, which describes the development patterns in virtually all of the world's megacities as well as smaller metropolitan areas.

He has addressed hundreds of audiences at major industry and academic conferences, international symposia, and government-sponsored seminars. He always receives high marks for his enthusiastic and challenging presentations.

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