

**WHY CREATING AND PRESERVING AFFORDABLE
HOMES NEAR TRANSIT IS A HIGHLY EFFECTIVE
CLIMATE PROTECTION STRATEGY**



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Executive Summary

California is currently debating how to invest greenhouse gas (GHG) cap-and-trade auction proceeds so that they result in real, quantifiable and verifiable greenhouse gas reductions.

A new analysis of data from Caltrans' California Household Travel Survey (CHTS) completed in February 2013 shows that a well-designed program to put **more affordable homes near transit** would not just meet the requirements set by the California Air Resources Board (ARB), but **would be a powerful and durable GHG reduction strategy** – directly reducing driving while creating a host of economic and social benefits.

Conducted by the nationally recognized Center for Neighborhood Technology (CNT), the analysis identified 36,000-plus surveyed households that had provided all relevant demographic and travel data and divided them into five income groups, living in three types of locations based on their proximity to public transportation:

- **Transit-Oriented Development (TOD) as defined by the California Department of Housing & Community Development (HCD)** requires homes be built within a 1/4 mile radius of a qualifying rail or ferry station or bus stop with frequent service.
- **TOD as defined by the Sustainable Communities and Climate Protection Act of 2008 (SB 375)** requires housing to be built within a 1/2 mile radius of a rail or ferry station, or a bus stop but with lesser frequencies than HCD's definition.
- **Non-TOD** areas that do not meet either of these definitions.

Here are two key findings:

- Lower Income households drive 25-30% fewer miles when living within 1/2 mile of transit than those living in non-TOD areas. When living within HCD's 1/4 mile of frequent transit they drove nearly 50% less.
- Higher Income households drive more than twice as many miles and own more than twice as many vehicles as Extremely Low-Income households living within 1/4 mile of frequent transit. This underscores why it is critical to ensure that low-income families can afford to live in these areas.

In response to soaring demand from Higher Income households for condos and luxury apartment developments near public transit, there has been a surge of new development. The CNT report shows the tremendous greenhouse gas reductions the state can achieve by ensuring that more low-income households can also live in these areas through investment of cap-and-trade auction proceeds.

DESIGNING A CAP-AND-TRADE INVESTMENT PROGRAM THAT MAXIMIZES GHG REDUCTIONS

The CNT analysis provides robust evidence that an investment by the state in the creation and preservation of affordable housing located within 1/4 mile of frequent transit can dramatically reduce GHGs.

Using conservative assumptions, TransForm and the California Housing Partnership calculated that investing 10% of cap and trade proceeds in HCD's TOD Housing program for the three years of FY 2015/16 through FY 2017/18 would result in 15,000 units that would remove **105,000,000 miles of vehicle travel per year** from our roads.

Over the 55-year estimated life of these buildings, this equates to eliminating **5.7 billion miles of driving off of California roads. That equates to over 1.58 million metric tons of GHG reductions, even with cleaner cars and fuels anticipated.**

What's more, the State can significantly increase these GHG reductions. The savings in miles driven described above is based solely on location and income, but HCD has a variety of ways their program could further reduce GHGs such as giving priority to developers who provide free transit passes for residents, adjacent carsharing pods, and bicycle amenities.

Finally, TransForm and CHPC offer a methodology for verifying and reporting the reductions.

Introduction

California has been a leader on climate change since passing AB 32, the California Global Warming Solutions Act in 2006.

Recognizing that transportation-related GHGs accounted for 37% of California's total GHGs, the legislature also passed SB 375 in 2008. The primary aim of this law is to reduce the amount people drive and associated GHGs by requiring the coordination of transportation, housing, and land use planning at a regional scale.

Ensuring that households of all incomes, and especially lower-income households who use transit most, are able to live near transit and jobs is crucial to the GHG reduction framework set up by SB 375. Yet the law does not provide any new financial resources to make the production and preservation of affordable homes near transit feasible.

AB 32 enabled the California Air Resources Board (ARB) to use market mechanisms to support reductions in GHGs. With the auction of greenhouse gas pollution allowances now taking place every quarter, state leaders are debating how to invest greenhouse gas cap-and-trade auction proceeds so that they result in real, quantifiable and verifiable greenhouse gas reductions.

In May 2013, ARB released its Cap-and-Trade Auction Proceeds Investment Plan, which identified "priority State investments to achieve GHG reduction goals and produce valuable co-benefits." ARB recommended that Sustainable Communities and Clean transportation receive the largest investment amount.

Importantly, ARB also recognized that the creation and preservation of affordable homes near transit should be part of this investment strategy, specifically naming the Department of Housing and Community Development's Transit-Oriented Development Housing program (HCD TOD) as an existing program that would be able to carry out a GHG reduction program relatively quickly and efficiently.

This report begins with CNT's analysis demonstrating for the first time the interrelationship between income and living in close proximity to transit, as defined by the HCD TOD criteria as well as by the SB 375 criteria.

The report then uses this information to calculate the GHG savings that would result from investing a portion of the cap-and-trade auction proceeds in affordable TOD homes over the next three years.

The key to CNT's ability to analyze these critical relationships is excellent, recent, statewide data made available by the California Household Travel Survey (CHTS) in 2013. The CHTS data, the collection of which was coordinated by Caltrans with support from a host of state and regional agencies, consists of one day travel surveys from over 40,000 households from all 58 counties in California and was collected from February 2012 through January 2013. CNT identified 36,197 household surveys from the CHTS that contained all relevant household demographic, location, and travel information needed for this analysis. A final report from CNT with additional data is anticipated in June 2014.

DEFINING TRANSIT-RICH AREAS AND STUDY METHODOLOGY

To determine accepted definitions of transit-rich areas, CNT worked with CHPC, TransForm and other experts to review California law and programs. Two well-used definitions were identified. The first is used by the California Department of Housing and Community Development (HCD) in its Transit-Oriented Development (TOD) Housing Program and the second is from the language of SB 375 defining High-Quality Transit Areas (HQTAs).

- **HCD TOD Areas** - HCD's TOD Housing Program Guidelines define TOD areas as being within 1/4 mile of a qualifying rail or ferry station or a bus stop with ten minute headways during the peak period defined as 7am to 10pm and 3pm to 7pm on weekdays. For any transit stop to qualify, it must offer hourly service on weekday evenings from 7pm to 10pm and have at least ten trips on both Saturday and Sunday. (TOD Housing Program: Third Round Guidelines, 2013.)
- **High Quality Transit Areas (HQTAs)** - SB 375 defines HQTAs as the area within 1/2 a mile of a rail or ferry station, regardless of service frequency at that station, as well as all bus stops with at least 15-minute headways during the peak period, as defined above.

CNT identified these geographies using its proprietary AllTransit™ database, which is based on the general transit feed specification (GTFS). AllTransit™ is the most comprehensive repository of GTFS data because CNT compiles publicly available feeds, acquires feeds that exist but are not publicly available, and codes its own feeds where none exist or are available. Areas that do not meet either of these definitions are defined as "non-TOD".

INCOME CATEGORIES

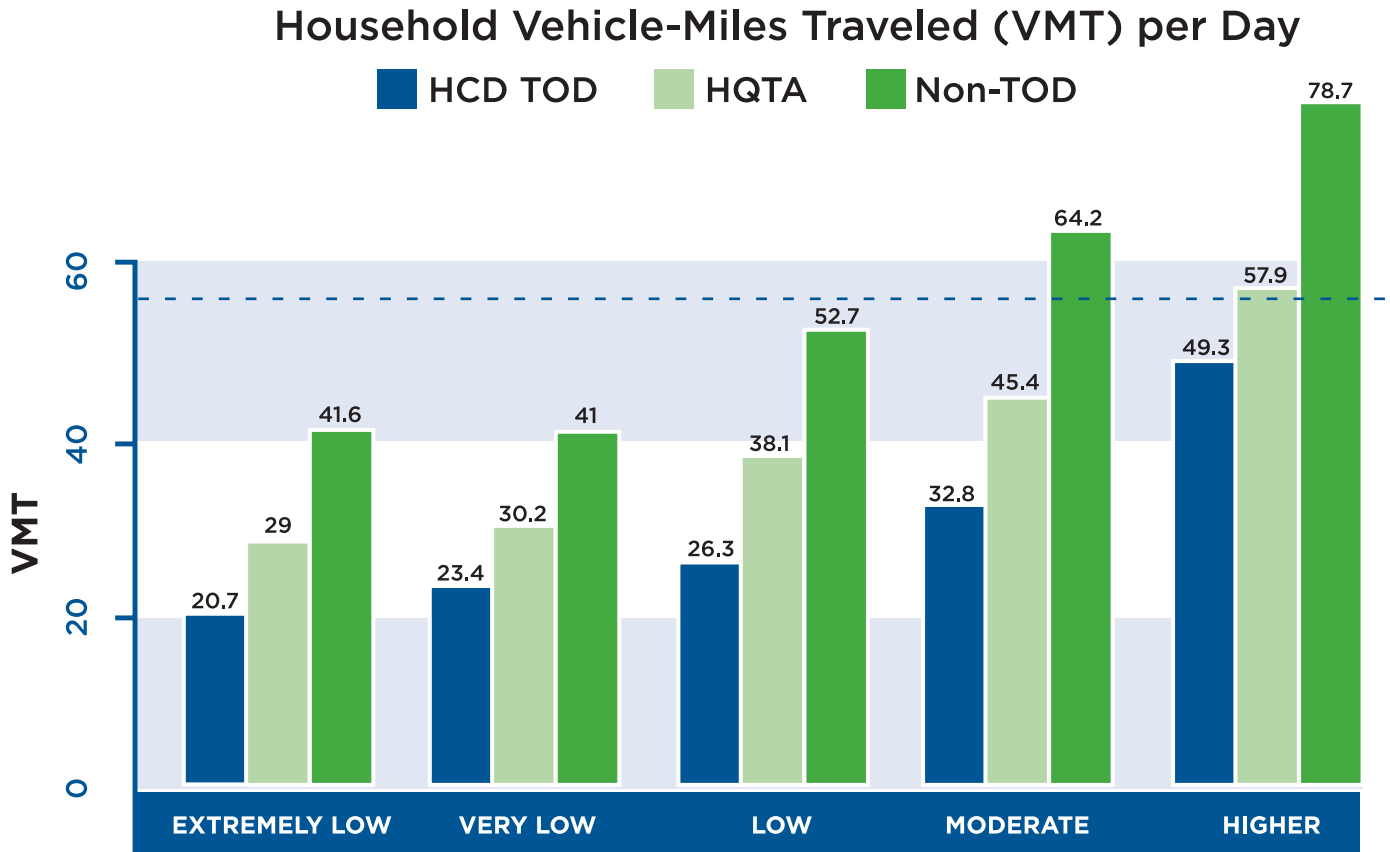
CNT categorized surveyed households using U.S. Department of Housing and Urban Development (HUD) income categories in order to compare households across all of California, which has wide variation in local incomes and housing costs. HUD publishes an annual listing of income thresholds based on the area Median Family Income (MFI) for each county by metropolitan area and includes adjustments for household size. HUD includes three lower income categories in this annual spreadsheet and CNT added two additional categories for moderate and higher income households based on the same assumptions used to calculate the lower income categories:

- **Extremely Low-Income (ELI)** - Households earning 30% or less of MFI
- **Very Low-Income (VLI)** - Households earning 50% or less of MFI
- **Low-Income (LI)** - Households earning 80% or less of MFI
- **Moderate Income** - Households earning between 80% and 120% of MFI
- **Higher Income** - Households earning more than 120% of MFI

INITIAL RESULTS

Preliminary findings from CNT's analysis of the CHTS reveal that living in proximity to transit-rich areas and household income are two major factors that impact the number of household trips as well as household vehicle miles traveled (VMT).

FIGURE 1. Household VMT per Day



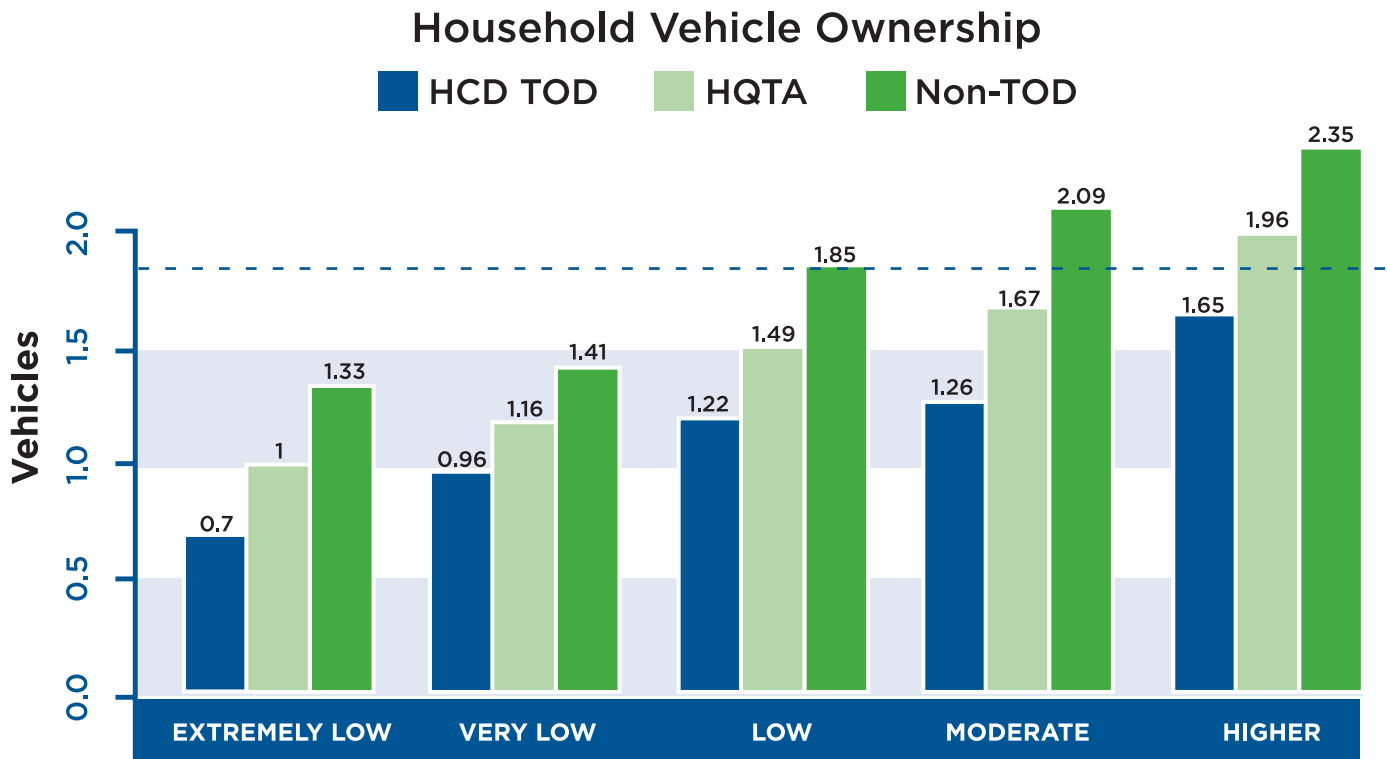
HUD Income Threshold

VEHICLE MILES TRAVELED (VMT)

The report data clearly shows that all income groups experience significant differences in average daily VMT depending on where they live. The difference in VMT for households living in HCD TOD areas compared to those in non-TOD areas range from 50% fewer VMT for Extremely Low-Income (ELI) to 37% fewer for Higher income households. All income groups living in HQTAs have 25-30% lower VMT than similar-income households living in non-TOD.

Extremely Low-Income households living in HCD-TOD areas have by far the lowest VMT of any household group, logging only 20.7 VMT per day on average, almost 60% less than the 49.3 average VMT of Higher income households also residing in HCD TOD areas.

FIGURE 2. Household Vehicle Ownership



HUD Income Threshold

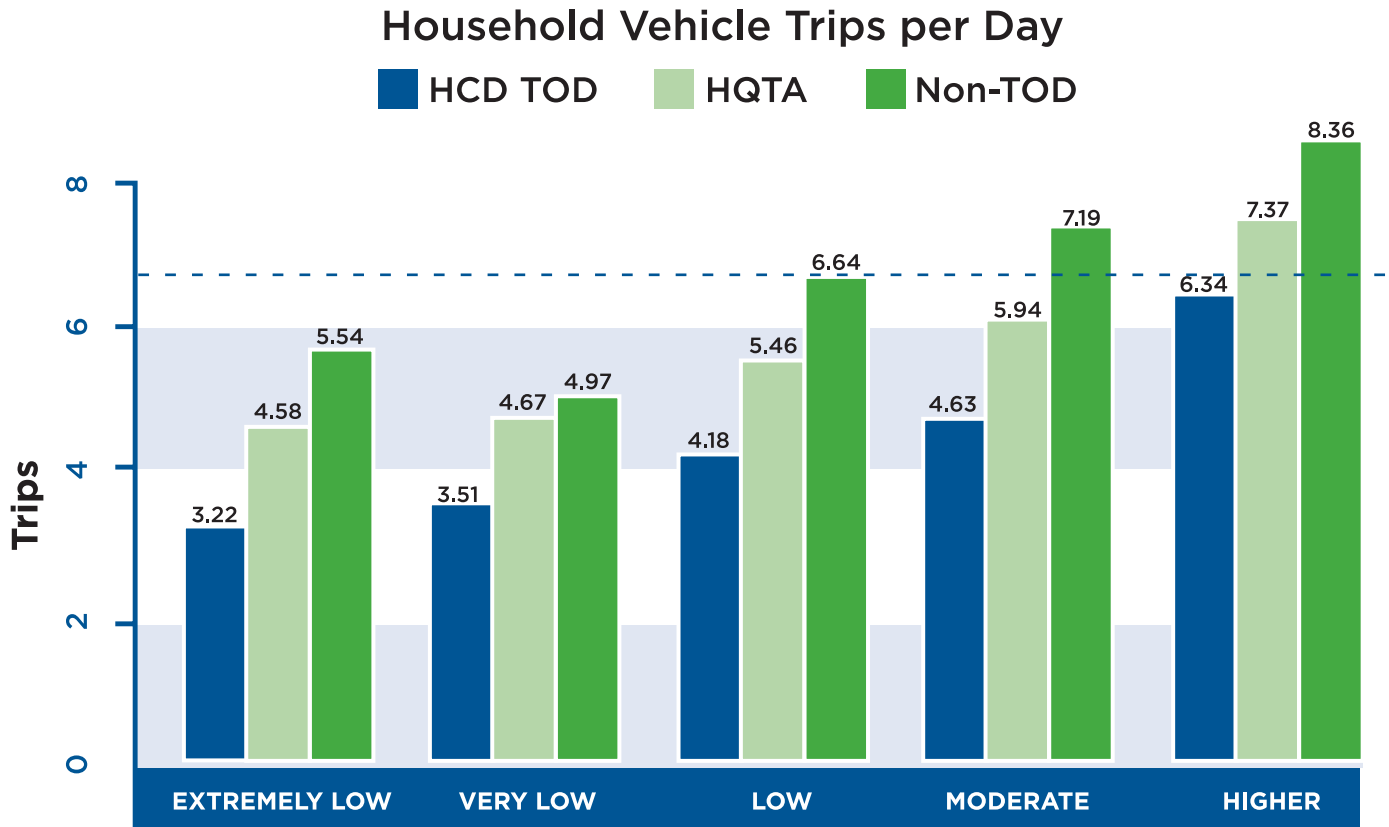
VEHICLE OWNERSHIP

The biggest single determinant of VMT—and therefore GHG emissions—is ownership of a private vehicle. Within the HCD TOD areas, all income groups own cars at a rate that is at least 30% lower than non-TOD areas. However, Extremely Low-Income households particularly economize on vehicle ownership when living in TOD. On average, these households own only 0.70 vehicles per household – less than half the number of cars owned by Higher Income households (1.65 vehicles per household).

The chart below demonstrates that, contrary to popular perception, lower income households have relatively high car ownership when they lack access to transit. This finding is significant because it indicates the large financial savings that lower income households can accrue by being able to avoid vehicle ownership by living near transit.¹ Transportation costs, primarily those associated with vehicle purchase, maintenance and operations, are the second highest household cost after housing.² In other words, providing affordable TOD homes not only lowers GHGs but also reduces both transportation and housing costs while providing strong access to services and employment opportunities.

There are other benefits of low-vehicle ownership rates. For example, vehicles take up significant space in the form of parking and street space. Locating affordable homes near transit allows communities to maximize the beneficial uses of these areas as shown in graphic on page 13.

FIGURE 3. Household Vehicle Trips per Day



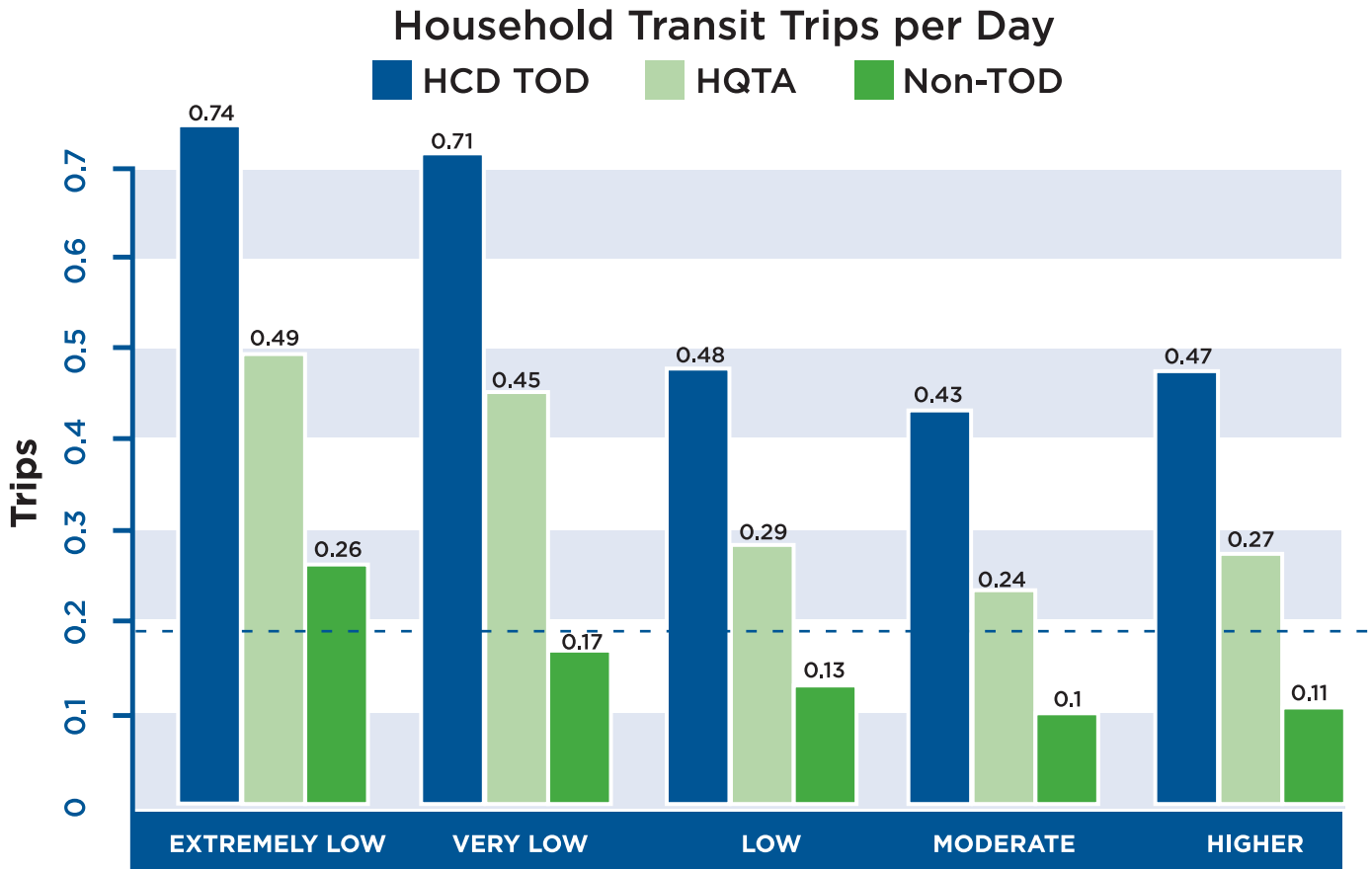
HUD Income Threshold

VEHICLE TRIPS

Income and location also have a significant correlation with the number of vehicle trips that are made. Figure 4, below, shows that households of all incomes make fewer vehicle trips when they live in HCD TOD areas compared to non-TOD locations. On average, Extremely Low Income households make only 3.22 vehicle trips per day – roughly half the number of trips made by Higher Income households (6.34 trips) in HCD TOD areas.

Fewer vehicle trips means not only fewer vehicle miles traveled but also less congestion and fewer vehicles idling in stop-and-go traffic. Congested driving conditions due to more vehicles on the road result in higher GHG emissions and criteria air pollutants. Reducing the number of trips in highly populated areas also has beneficial air quality impacts and can improve bicycle and pedestrian safety.³

FIGURE 4. Household Transit Trips per Day



HUD Income Threshold

TRANSIT TRIP FINDINGS

From a transportation investment policy and planning perspective, it is important to know that households in transit-rich areas not only drive less, but also use transit more. In this regard the findings on differences based on both location and income are profound:

Households living in HCD TOD areas use transit at rates that are triple or quadruple the rates of households living in non-TOD areas. The transit trip bonus⁴ is much higher, however, for the groups making less than 50% of median income. Extremely Low Income and Very Low Income households living in a HCD TOD take transit 50% more than their neighbors from higher income brackets.

Designing a Cap-and-Trade Investment Program that Maximizes GHG Reductions

The California Department of Housing and Community Development (HCD) developed a program for funding affordable homes near transit, with the first rounds of funding. Initially funded by the passage of Proposition 1C in 2006 this Transit-Oriented Development Housing Program (TOD) is now depleted.

The TOD Housing program was designed with the specific goals of increasing public transit ridership, minimizing automobile trips, and promoting GHG reductions. This report demonstrates that HCD's TOD program is an excellent starting point for an affordable housing program that is focused on maximizing GHG reductions.

Some strong key attributes of the existing HCD TOD program include:

- location within 1/4 mile of frequent transit;
- strong access to services and job centers;
- serving households at lower income levels;
- offering additional points for:
 - free or discounted transit passes to residents;
 - innovative parking, including allowing shared parking between different; uses and
 - offering dedicated spaces for carsharing vehicles.

CREATING AN EVEN MORE TRANSFORMATIVE AFFORDABLE TOD HOME PROGRAM

If funding for HCD's TOD program is to be focused on further increasing GHG benefits, both for residents and for the surrounding community, the program could consider potential changes that include providing additional incentives to developers who are proposing to include more GHG-reducing measures. These measures can include:

Focus on housing more ELI and VLI households. The HCD TOD program currently sets a minimum of 15% of all units be made affordable to low income households with maximum points awarded for applicants increasing this level to 25%. However, there are no requirements to serve ELI or VLI households, per se. Now that we have new data showing the GHG associated with housing these income groups, we propose that the HCD TOD program provide incentives to developers to provide at least 10% of the homes affordable to ELI households and provide maximum points for developers willing to go above the current 25% maximum. In recognition of the greater costs involved in producing housing affordable to these lower income households, HCD TOD should consider increasing loan and grant amounts accordingly.

Free transit passes. Studies have shown that free transit passes lead to much higher transit ridership and lower GHGs. For example, a survey of 1,500 low income renters found that 64% use a transit pass more than four times per week, and 22% said their passes reduce the number of cars owned in their household.⁵



A family at First Community Housing's Fourth St. Apartments shows off their free VTA transit passes. These passes would typically cost \$770 per year for adults and \$495 for children.

Car share vehicles on site, with free membership for residents. Car sharing dramatically reduces vehicle ownership and trips, especially in areas with strong access to transit.⁶ Yet there have been few models of long-term agreements to provide on-site carsharing. TransForm's GreenTRIP program has worked with City CarShare, Zipcar and affordable housing developers to arrange for long-term agreements for pods in or adjacent to new developments. To maximize GHG benefits and get additional points, developers could be encouraged to have electric vehicles, or at least high mileage hybrid cars, carshare pods.

Create space for bike sharing. By 2015 there will be bike sharing programs in the four major regions of California. The evidence of bike sharing's benefits and what it takes to do it well (especially the need for a larger scale) is growing by the month.⁷ Creating the space for bike share pods adjacent to new developments is critical.

Other innovative trip reduction strategies. Providing amenities like bicycle-fixing stations, pedestrian trunks to support walking to shopping, and travel kiosks that have real-time travel information will also help reduce VMT.

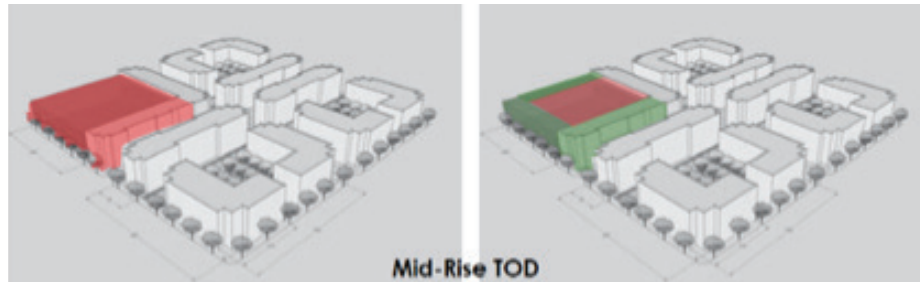
Less Parking: An example of the additional benefits of affordable homes near transit.

CNT's analysis shows that Higher Income households living in HCD TOD areas have vehicle ownership rates of 1.65 vehicles/household. In comparison, extremely low income households only own on average 0.7 vehicles/household. While there are several benefits of lower vehicle ownership, the reduced need for parking is a significant one. We have developed a graphic representation showing the reduced parking needed for a hypothetical development near transit and the increase in the number of homes that can be provided.

By designating 100% of the homes as "affordable" for Extremely Low-Income households, in a prototypical eight-acre development site with an initial plan of 875 units in six-story buildings and 1.65 parking spaces per unit (parking in red), the parking can be reduced to 0.7 spaces/unit. Within the exact same building envelope the developer can add 146 units to the same building envelope (seen as green). The number of spaces can be further reduced by adding the trip reduction strategies mentioned above.

1.65 PARKING SPACES PER UNIT

vs. 0.7



| | 1.65 HIGHER INCOME | 0.7 EXTREMELY LOW-INCOME | CHANGE |
|----------------------------------|--------------------------|--------------------------------|----------|
| Units | 875 | 1,021 | +146 |
| Parking Spaces | 1,444 | 715 | -729 |
| Parking Cost (\$20,000/space) | \$28.8 | \$14.3m | -\$14.5m |

Estimating the future GHG reduction benefits of building affordable transit-oriented development

For this analysis, we assume that a new affordable unit will be occupied by a household moving from a location less accessible by transit. While it can not be guaranteed that new units will be occupied by a mover of this type, each new unit represents an addition to the total supply of housing near transit and an additional household living near transit that otherwise would not be able to afford to do so.

We focus our calculations on Extremely Low-Income and Very Low-Income households because public investment is most essential to building and preserving homes for these income groups. We assume that homes in affordable TOD would serve 50% ELI households and 50% VLI households.

We also assume that public investment in affordable TOD would be focused in areas meeting HCD's TOD program criteria.

The average difference in daily VMT for ELI and VLI households living in HCD TOD areas vs. non-TOD is **-19.25 VMT per day**. The annual difference is **-19.25 VMT x 365 = -7,026.3 VMT**.

If 10% of cap-and-trade funds are invested in affordable TOD as currently proposed, an average of \$250 million per year will be invested in each of the three fiscal years running from 2015/2016 through 2017/2018. (This assumes total cap-and-trade allocation of \$2 billion the first year, rising by \$500 million per year)

Using HCD's current TOD program guidelines, we assume that each building would get the maximum of \$50,000 per unit from these cap-and-trade funds. In the past, each affordable unit receiving funding has been required to remain affordable for 55 years, so we keep that timeframe as the durability of the program.

Using these conservative assumptions, investing 10% of cap-and-trade proceeds in HCD's TOD program would result in 15,000 transit-connected homes that would remove **105,000,000 miles of vehicle travel per year** from our roads.

Over the 55-year estimated life of these buildings, this equates to eliminating **5.7 billion miles of driving off of California roads. That equates to over 1.58 million metric tons of GHG reductions, even with cleaner cars and fuels anticipated⁸.**

WHY THIS GHG CALCULATION IS CONSERVATIVE

The GHG benefits stated above are conservative in several ways. Most importantly, the estimate only includes direct GHG reductions from the difference in location, when in reality it will be possible to estimate additional benefits due to these factors:

- On-site trip reductions strategies that are part of HCD's TOD program.
- Access to new carshare, or through new local services (if applicable).
- Low-income households, on average, own less efficient vehicles that generate more GHGs⁹. As new vehicles quickly increase their efficiency, especially the more expensive hybrids and electric vehicles, that differential is likely to increase.
- Homes for low-income families are more compact, meaning a greater density of homes and a better use of these limited areas¹⁰.

HOW TO BEST VERIFY ACTUAL GHG REDUCTIONS?

To analyze actual reductions of vehicle miles travelled and GHGs we recommend that HCD and ARB design a monitoring program that could include travel diary surveys, or sample trip generation studies (using black pneumatic tubes). While HCD would need to ensure proper design and implementation of these methods, they all are feasible to get a good estimate of VMT.

Finally, we suggest that firm commitments for on-site trip reduction strategies be developed. TransForm's GreenTRIP program now works to get these commitments written into the conditions of approval for the project, for example.

CONCLUSIONS

The findings of this report make clear the powerful way in which living close to transit and household income affect household travel behaviors. Increasing the amount of housing in transit-rich areas for households of all income levels can help reduce the state's GHG emissions. While private equity markets are actively investing in transit-oriented residential development for Higher Income households, there is next to no private capital to meet the need to preserve and create homes in transit-rich areas that are affordable to Low Income households.

Investing cap-and-trade funds in affordable TOD will ensure that the state captures the full GHG reduction benefits possible from the integration of land use, housing, and transportation planning. These benefits include:

- Reducing VMT for low income households by nearly 50% from non-TOD locations and achieving levels of VMT 60% below those of higher income households also living in TOD.
- Reducing car ownership by .63 vehicles per household, or more than one car for every two low income households, and freeing up land used for parking to create housing and public space.
- Decreasing vehicle trips and increasing transit trips, helping to ease congestion and increase transit ridership by at least 50% more than the ridership achieved by Higher Income households.
- Lowering household transportation costs and providing improved access to jobs and services.

Furthermore, affordable housing developers have a proven track record of implementing transportation demand management strategies like those structured into the HCD TOD program including: reduced parking, free transit passes for residents, and bike and car share on site. With these policies in place, the production and preservation of affordable TOD homes funded through cap-and-trade will reduce VMT by millions of miles per year, offering an important tool in California's efforts to reduce GHG emissions.

ENDNOTES

1. California Housing Partnership Corporation, *Building and Preserving Affordable Homes Near Transit: Affordable TOD as a Greenhouse Gas Reduction and Equity Strategy*. 2013. <http://chpc.net/dnld/AffordableTODReport030113.pdf>
2. TransForm, *Windfall for All*. 2009. <http://www.transformca.org/windfall-for-all>
3. Community Cycling Center, *Understanding Barriers to Bicycling Project*. Final Report, July 2012. <http://www.communitycyclingcenter.org/wp-content/uploads/2012/07/Understanding-Barriers-Final-Report.pdf>
4. The transit trip bonus is the absolute difference in the mean number of transit trips.
5. First Community Housing, *Ecopass Program*. 2009. <http://www.firsthousing.com/wp-content/uploads/2009/05/ecopass1.pdf>
6. "20% of car-sharing households give up one or more vehicles, and on average 34% forgo buying a new car." Transportation Research Board, *Transit Cooperative Research Program (TCRP) Report 108, Car-Sharing: Where and How it Succeeds*. 2005. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_108.pdf
7. ITDP concludes that Bike-share systems should aim for four daily uses per bike to maximize the public cost-benefit. ITDP, *The Bike Share Planning Guide*. 2013. <https://go.itdp.org/display/live/The+Bike+Share+Planning+Guide>
8. Estimates used conversion factor of 273.15 CO2 grams per mile based on ARB's EMFAC 2011 CO2 emission rates. These include Low Carbon Fuel Standards and "Pavley" efficiency standards. 2035 rates were used as the average for all years.
9. "In sum, poor households that own vehicles own dirtier vehicles than wealthy vehicle owners." Sara West, "Equity Implications of Vehicle Emissions Taxes", *Journal of Transport Economics and Policy*, Volume 39, Part 1, January 2005, pp. 1-24. S <http://www.maclester.edu/~wests/westjetp1910.pdf>
10. California Air Pollution Control Officers Association (CAPCOA), *Quantifying Greenhouse Gas Mitigation Measures: A Resources for Local Government to Assess Emission Reductions from GHG Mitigation Measures*, August 2010.