



Combating Climate Change in the Capital of Car Culture

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December 2013



Next Generation

Part 1

Say the words “Los Angeles,” and you might conjure visions of epic traffic jams, air pollution so thick you can’t see the hills, and a city that seems designed to intimidate and marginalize pedestrians and bicyclists.

But a new reality is emerging in the city of angels. A slew of developments over the past decade is helping the world capital of car culture transform itself into a world leader in sustainable transportation. While traffic is still bad, the air is significantly cleaner, and public transit alternatives are expanding.

If the trends continue, L.A.’s transportation sector could become a model for California—and the nation—as we struggle to end our dependence on oil.

From Traffic Mecca to Clean Transport Leader?

L.A.’s reputation as the mecca of traffic is well-deserved, but its history provides some clues about its potential to be a transportation leader. In the 1950’s, city planners envisioned an extensive freeway system complemented by a futuristic monorail line that could whisk Angelenos to and from work. The freeways were built—today they span 181 miles and carry over 2 million cars—but the monorail remained a dream, overwhelmed by L.A.’s addiction to the passenger vehicle.

Now the landscape is changing. In June 2013, Los Angeles County [awarded two construction companies a \\$2 billion contract for a rail line to the airport](#), gearing up for an aggressive public transit expansion featuring a “Subway to the Sea.”^{1,2} Once a smog-choked metropolis, L.A. has dramatically reduced air pollution through cleaner cars and trucks. And since 2007, L.A. has sat on the 10-city Steering Committee of [C40](#), an international consortium of megacities committed to combating climate change.

L.A.’s recent moves toward sustainability align closely with California’s goal of reducing carbon dioxide emissions by 80 percent by 2050. The success of that goal will depend in large part on tackling transportation emissions, which compose nearly 40 percent of total state emissions. As the biggest and most car-dependent metro area in the state, L.A.’s efforts on emissions reduction will be crucial to meeting California’s ambitious targets and will help set an example for cities around the world. Ultimately, the city’s success will depend on its ability to drastically reduce the transportation sector’s reliance on oil.

Los Angeles has already made considerable progress toward reducing greenhouse gas emissions, thanks in large part to the city’s voters, who have indicated their strong preference for leaders who push the envelope on clean transportation. While Mayor Antonio Villaraigosa drove many of the groundbreaking changes of the past decade, L.A.’s newly-elected Mayor, Eric Garcetti, has pledged to continue support for clean transportation options. In 2007, [Mayor Villaraigosa’s “Green L.A.” report](#) called for reducing carbon dioxide emissions by 35 percent in the year 2030, compared to 1990 levels, paving the way for compliance with California’s overall greenhouse gas reduction targets.^{3,4}

Thanks to city control of the electric system, L.A. has made remarkable advances toward reducing emissions from the generation and distribution of electricity. L.A.’s municipally-owned utility, the Los Angeles Department of Water and Power (DWP), [has reduced its emissions by 28 percent](#), largely through renewable energy, and will achieve around a 40 percent reduction by 2025, which is the year it will cease all consumption of coal power.⁵

But reducing emissions from transportation is just as important as greening the city’s power system—and a far more difficult task. The City can only indirectly affect emissions from the largest slice of transportation emissions—private passenger vehicles—whereas L.A. exerts direct control over

the DWP. Moreover, counting up carbon dioxide molecules from a power plant smokestack is straightforward, but estimating the environmental impact of billions of car trips is daunting.

Nevertheless, L.A. does have power over the large, publicly-funded transportation infrastructure projects that influence individual transit behavior. It is here that the city has set the stage for ongoing emissions reductions; in the process, it may help seed a cultural transformation in the way people think about cars and transit.

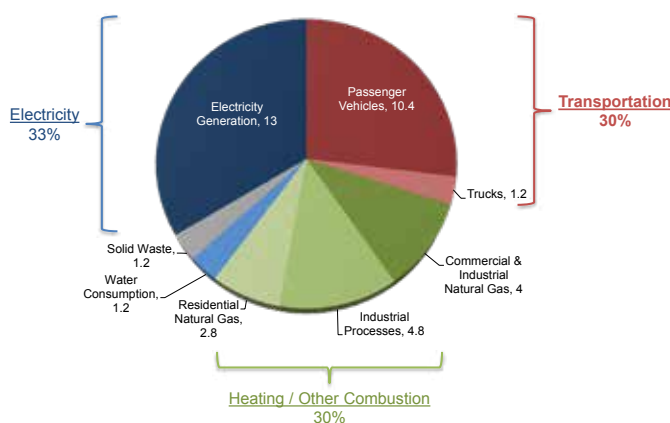


Figure 1a: Los Angeles Carbon Dioxide Emissions. Citywide CO₂ emissions broken down by source. Source: 2010 ICF Analysis.

Lifting the Blanket: Smogtown no more

The first thing old-timers notice about Los Angeles' transformation is the skyline: You can actually see it. In 1970, smog blanketed the city; on the worst days, you couldn't see the famed Hollywood sign from downtown, a mere six miles away. Today, the concentration of smog-inducing compounds [has dropped 98 percent](#).⁶

The federal Clean Air Act of 1970 set national air quality standards that gave states and cities a new tool to combat pollution, but California went further to implement strong smog reduction measures, from which L.A. benefited.⁷ As automakers introduced catalytic converters to vehicles, and oil companies complied with state clean diesel requirements, levels of ozone, carbon monoxide, nitrogen oxides, and other toxic pollutants [plummeted in L.A.](#)⁸

The public health benefits of cleaning up air pollution are well-documented. For example, [two recent studies demonstrate](#) a clear link between lower infant birth weight and higher emissions of particulate matter.^{9,10} By [halving particulate matter emissions since 1988](#), L.A. decreased the chance of low birth weight (less than 5 pounds 8 ounces) by 9

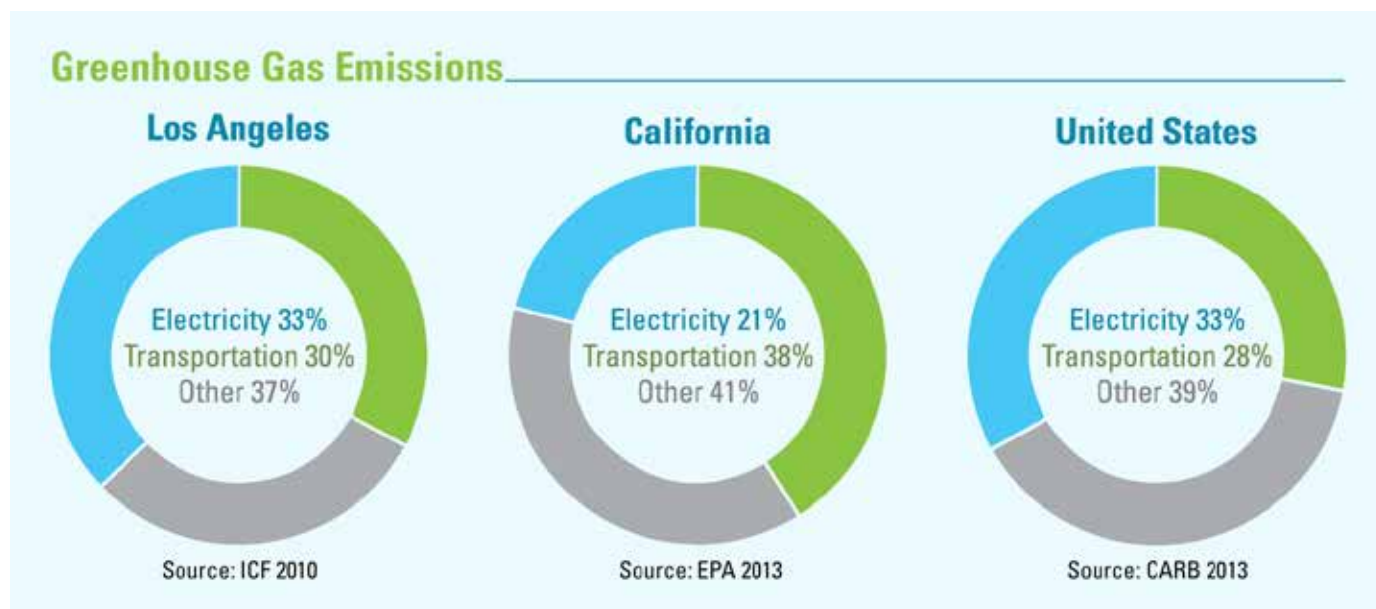


Figure 1b: Comparison of local, state, and federal emissions. Emissions breakdowns from Los Angeles, California, and the United States. Sources: ICF, 2010; EPA, 2013; CARB, 2013.

percent.¹¹ Still, there is room for improvement—one study estimates the health and economic cost of L.A.’s emissions remaining above federal standards at over \$20 billion; vigilance is required to continue decreasing levels of ozone and particulate matter that are proven to cause bronchitis, heart attacks, and premature death.¹²

While the economic and public health impacts of clearing the air and enabling a healthy workforce are profound, a hidden co-benefit is the reduction of greenhouse gases and other “climate forcer” pollutants that exacerbate global warming. For example, between 1988 and 2008, the California Air Resources Board passed increasingly stringent regulations on diesel fuel and engines, which had the effect of cutting emissions of black carbon—a product of diesel emissions, a primary ingredient in smog, and also the second-largest contributor to global warming.¹³ So thanks to effective air quality regulations, even as California’s diesel emissions quintupled over the past half-century, the levels of black carbon in the atmosphere decreased by 90 percent, with attendant climate change benefits.¹⁴

The Shipping News: Ports Get Clean Trucks

Building on this success, the Ports of Los Angeles and Long Beach, which together handle more container cargo than any other port in the nation, released a Clean Air Action Plan in 2006 to improve air quality around the ports. The impetus for the plan was economic and health considerations—five years earlier, a court had enjoined the Port of L.A. from constructing a new terminal because pollution from the Ports had increased the risk of cancer in the surrounding area.¹⁵ Confronted by barriers to global competition and an irate surrounding community, the ports signed a pledge to reduce pollution by at least 45 percent within five years.



Figure 2: Air Quality Improvements at the Ports of L.A. and Long Beach. Emissions reductions in percentages and tons from 2005 to 2011, following the Clean Air Action Plan. Expanded pollutant acronyms: DPM - Diesel Particulate Matter, PM_{2.5/10} - 2.5/10 micron particulate matter, NOx - Nitrogen Oxides, SOx - Sulfur Oxides. Truck emissions, regulated by L.A.’s Clean Trucks Program, accounted for the majority of greenhouse gas emission reductions. Source: *Port of Los Angeles Clean Air Action Plan Report Card 2011*.

A centerpiece of those efforts was L.A.’s Clean Trucks Program, aimed at modernizing the 17,000 mostly inefficient diesel trucks that haul goods to and from the Port. The law imposed stringent emission regulations, immediately took 2,000 pre-1989 trucks off the road, and has culminated in a clean fleet of 5,500 trucks powered by electricity or alternative fuels like natural gas.¹⁶ As a result, harmful emissions (diesel particulate matter, nitrogen and sulfur oxides) from trucks have plunged 80 percent; across the two ports, the Clean Air Action Plan is on target to reduce the risk of cancer in adjoining communities by 85 percent.¹⁷

While addressing climate change was not the primary motivation for action at the ports, emissions reduction was a strong collateral benefit. Combined greenhouse gas emissions at the two ports fell 18 percent from 2005-2011, and over half of that

reduction came from cleaner heavy-duty trucks. To put this in context, the Port of L.A., accounting for about a million metric tons annually of regional CO2 emissions, [composes almost 3 percent of L.A.'s citywide emissions](#).¹⁸

Again, the City's sovereignty played a big role in this success story; like the L.A. Department of Water and Power, the city has direct control over the Port of L.A.

The Big Kahuna: Private Passenger Vehicles

While the greenhouse gas reduction from the port campaign was dramatic, emissions from the Port's trucking fleet are dwarfed by those of the other vehicles on the road. To address those emissions, the City must figure out how to slash pollution from its 2 million passenger vehicles.

The challenge: car culture is part of L.A.'s DNA, reflected in its sprawling infrastructure. So City policies over the past eight years have aimed to rein in emissions even as [Los Angeles remains the most congested city in the US](#).¹⁹ Vehicle Miles Travelled (VMT) is a popular metric to evaluate the prevalence of car transportation, but two other important factors affect emissions per VMT: traffic dynamics and car technology. Through three promising policies, L.A.

has sought to streamline traffic flows and support electric vehicles, reducing both emissions and commute times.

Last February, as the Mayor flipped the switch on the last of 4,000 synchronized stoplights, L.A. became the first major city in the nation to synchronize its entire network of traffic signals. Using magnetic sensors in the road and geolocation of its transit system, traffic controllers will now hold a green light for buses to efficiently traverse their routes; the system can even reroute flows citywide to minimize waiting times and streamline traffic. As a result, average speeds on surface streets have climbed from 15 to 17.3 miles per hour, and travel times are down 12 percent. The city's Department of Transportation (LADOT) [estimates the emissions benefit at a million metric tons of avoided carbon dioxide](#), around 10 percent of all vehicle related emissions.²⁰

To further manage traffic flows, L.A. is in the midst of a congestion pricing trial along its Harbor Freeway. In 2012 LADOT turned a high-occupancy vehicle (HOV) lane into a high-occupancy toll (HOT) lane that allows single passenger cars to use the lane by paying a variable amount (\$0.25 - \$1.40 per mile) depending on prevailing traffic conditions.²¹ Cars burn gasoline most efficiently when travelling at a steady clip, between 50-60 m.p.h., and congestion pricing both increases average speeds and decreases speed variability. Therefore, [one study contends](#) that

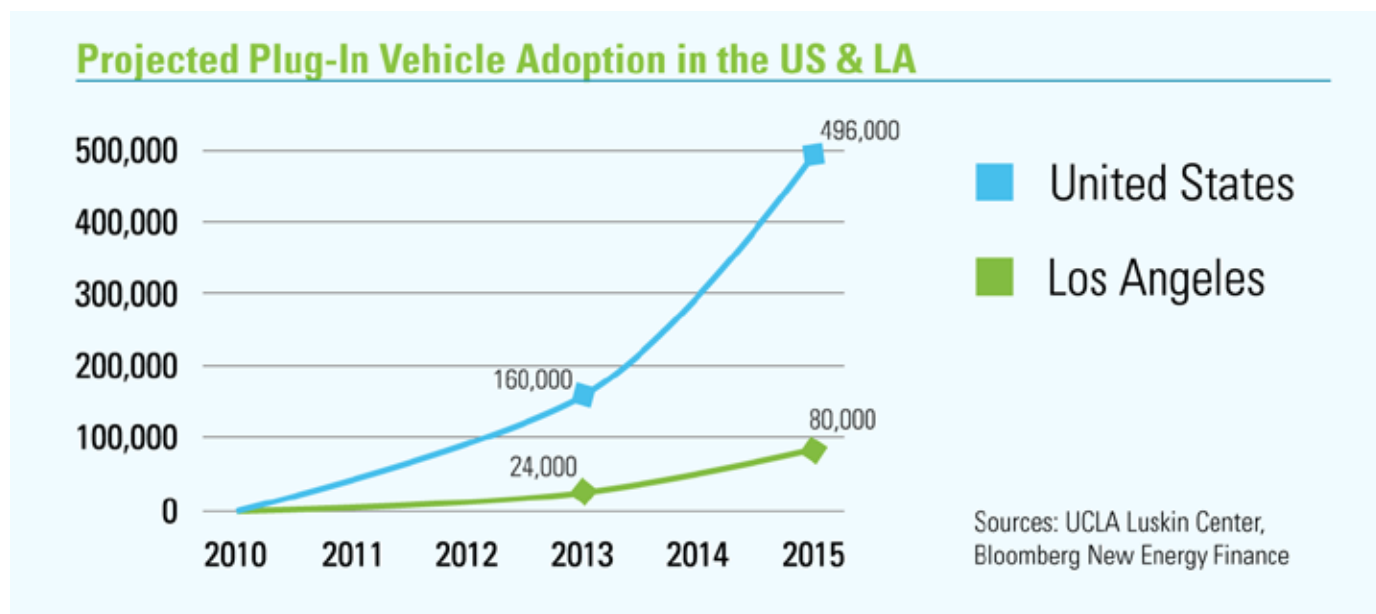


Figure 3: Projected Plug-in Vehicle Adoption. Projections of cumulative electric vehicle and plug-in hybrid electric vehicle sales in Los Angeles and the United States. Sources: UCLA Luskin Center and Bloomberg New Energy Finance.

congestion pricing can reduce emissions from 7 to 12 percent in L.A.—though at this limited trial stage, it is too early to assess that claim.²²

Charging Electric Cars: the Utility of the Future

Finally, the L.A. Department of Water and Power (DWP) has extended the scope of its environmental efforts beyond stationary electricity sources, like power stations and rooftop solar systems, to electric vehicle (EV) infrastructure. Through “Charge Up L.A.!” DWP subsidizes charging equipment at home and at the workplace; DWP also has 140 standard chargers set up around the city, along with 16 “Level III” chargers that will [recharge an EV in just 20 minutes](#) (Figure 3).²³ This network of “DC Fast-Chargers” alleviates range anxiety among EV owners, ensuring that a charger is within five miles of any major freeway.

By supporting EV chargers, DWP is reducing the barrier to entry for EV ownership. Over the long term, DWP also hopes to take advantage of an extensive EV network and to use cars as mobile batteries to store and discharge energy from renewable sources.

Thanks in part to these programs, [L.A. is projected to top the nation in cumulative EV and PHEV adoption](#), with 80,000 EVs on the streets by 2015.²⁴ City policies have made it easier to transition from a gasoline vehicle—but substantial emissions reduction will only happen if EV penetration increases by an order of magnitude. In the meantime, while L.A. has embarked on a promising path to reduce the emissions intensity of cars on the road, its parallel effort to boost public transit ridership is essential for a transition away from oil.

This Train is Bound for Glory

Over a hundred years ago, the Los Angeles Railway maintained a network of streetcars and narrow-gauge trains that helped connect the city in the decades before the advent of cars. With the passage in 2008 of a new sales tax dedicated to transportation improvements, L.A. may be on a road back to the future—Measure R is expected to generate more than \$4 billion over 30 years to fund a vast expansion of L.A.’s Metro rail service.²⁵



Figure 4: LA’s Clean Transport Expansion. The map displays Metro’s plans to extend its rail service using funds from Measure R and America Fast Forward federal legislation. Additionally, the orange dots denote the locations and existing and proposed Level III EV Chargers, installed by DWP. For a limited time, L.A. residents can use the chargers for free, and the network has been organized to ensure easy access from any major L.A. highway. Sources: L.A. Department of Water and Power; L.A. County Metropolitan Transportation Authority.

Over the coming decades, L.A. will extend its subway to the Pacific Ocean and add rail lines to districts like Westwood and South L.A. The County’s Metropolitan Transport Agency predicts that the projects will [create 160,000 jobs and reduce VMT by 208 million miles annually](#).²⁶ Accelerating transit-oriented development, where the City encourages dense commercial and residential development near public transit nodes to reduce travel distances, will further boost economic and environmental metrics. The success of existing developments, like the [Hollywood & Highland Development](#), bodes well for new and ambitious projects like the planned [Sixth Street Viaduct](#). Rounded out by a bus fleet that runs on 100 percent alternative fuels, L.A.’s transit system will provide a compelling and sustainable alternative to the passenger vehicle.^a

^a An important distinction here is between the City of Los Angeles and Los Angeles County. The prior policies introduced have all been City policies, and this report mostly concerns City-level policies under the Mayor’s purview. However, L.A. County’s Metropolitan Transportation Authority (MTA) manages rail service within the City and therefore will implement the Measure R projects to expand rail transport. While Mayor Villaraigosa did not directly oversee the MTA, he did serve as chairman of the Board and appointed three others to the 13 member Board.

Part 2:

The Unifying Theme: Electrification

Like most cities, L.A. is largely divided between two energy systems, for stationary and mobile applications. Utilities provide power and heat for homes and businesses (stationary), while oil companies provide gasoline and diesel for cars and trucks (mobile). Like 2,000 other municipalities, L.A. controls its own power utility (DWP)—therefore, L.A. can exert far more control over its transportation emissions if it successfully electrifies the sector, bridging stationary and mobile energy.²⁷

L.A. has the most policy success when it plays to its strengths. For example, the Clean Trucks program leveraged L.A.'s authority over its port to dramatically reduce diesel emissions from heavy trucks. Similarly, L.A. is rapidly adopting a more sustainable electricity supply and could compound the emissions savings if more cars and trucks plugged into the DWP grid, and if Angelenos used electrically-powered public rail transit.

While electric trains are an extremely efficient mode of transportation, adoption of electric vehicles elsewhere in the US will [only mean marginal reductions in emissions](#).²⁸ Gas-powered and electric vehicles are apples and oranges with respect to emissions—but a fair comparison can be made between their global warming impacts. EVs are assigned an “equivalent” m.p.g. rating to a gas-powered car with that m.p.g. if the power that was generated and transmitted to the EV caused GHG emissions equal to those of the gas-powered vehicle.

LA's power supply: renewables up, CO2 emissions down

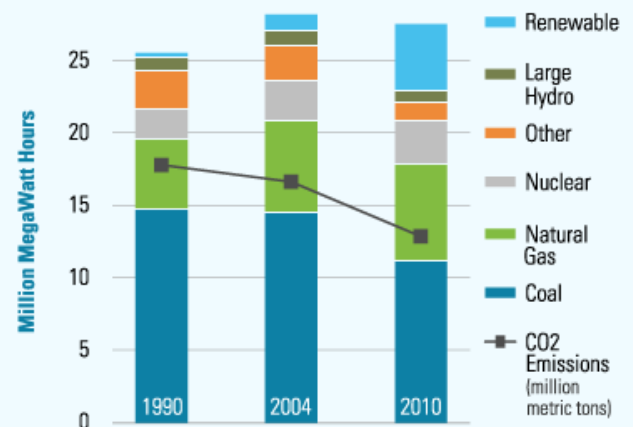


Figure 5: DWP Electricity Sources and Emissions. Increasing share of renewable energy, on target to meet the state Renewable Portfolio Standard of 33 percent by 2020, has contributed to a 28 percent decline in carbon dioxide emissions. Data provided by DWP.

In over half the nation, high electricity grid emissions mean that electric vehicles will get an equivalent fuel mileage between 30 and 50 m.p.g.; since federal CAFE fuel standards will mandate that cars average 54.5 m.p.g. by 2025 anyway, electrification has limited upside in those areas. In 2005, when L.A. received half its power from coal—much like the rest of the US—electric vehicles were not a compelling proposition. Now as DWP's emissions track those of California, a gasoline-powered vehicle must achieve 79 m.p.g. [to match the low emissions of an EV in L.A.](#); conversely, an EV in Denver has the same greenhouse gas emissions as the 33 m.p.g. Mazda 3.²⁹ L.A. needs to seize this opportunity to merge its stationary and mobile sectors to squeeze out oil.

Friendly Competition – A Race to the Top

Competition between cities is integral to the success of the C40 coalition of global cities committed to fighting climate change, and L.A. has earned the right to show off its environmental progress. But it is worthwhile to listen to the boasts of other cities as well, especially if L.A. hopes to avoid their pitfalls. Rather than reinvent the wheel, L.A. can sample from an extensive menu of initiatives pioneered from Singapore to Stockholm; adapting any or all of the following three examples of sustainable transportation policy to L.A.'s context could accelerate our exit from oil.

Congestion Charging—Singapore, London, Stockholm

The most straightforward solution to L.A.'s notorious traffic is a policy that charges drivers who use the busiest roads, thereby internalizing the externalities of congestion and pollution in individual decision-making. Fortunately, there are several successful examples of such programs around the world which offer proven technologies and insights should L.A. choose to expand its nascent congestion toll initiative.

In 1975, Singapore first demonstrated that congestion charging could [dramatically reduce vehicle density in central urban areas, increase public transit ridership, and fundamentally alter the public transportation culture](#).³⁰ In 2003, London followed suit, inaugurating the largest congestion charging scheme in the world; today, the policy has reduced aggregate VMT by 10 percent in the face of a 13 percent increase in population. The most definitive proof of congestion charging benefits comes from Stockholm, which implemented a six-month trial policy that saw traffic volumes decrease by 20 percent and rebound after the trial ended—by then, [70 percent of voters supported the policy](#), up from 30 percent before the trial.³¹

These three programs all charge drivers for crossing a cordon delineating a central urban zone, though [they differ on the enforcement technology](#).³² Singapore and Stockholm require cars to carry transponders which interact with sensors on the cordon, whereas London employs automatic license

plate recognition, which is more expensive for the City but easier on drivers.

L.A.'s urban geography is less conducive to a cordon-based approach because of its dispersed layout. To successfully deploy congestion charging, L.A. would have to design a customized approach, perhaps opting for multiple cordons around commercial centers or charging per-mile tolls on congested arteries between city centers. However, the experience of three successful programs around the world eliminates a lot of the heavy lifting. L.A. can choose between Singapore's transponder system or London's automated cameras to minimize cost and intrusiveness as it sees fit. It can confidently design the scheme using traffic modeling software which [accurately predicted the effect](#) of congestion charging in Stockholm.³³ And it can aim to reproduce the public support, funds for public transit, and emissions reduction that resulted in all three previous projects.

Transit-Oriented Development in Portland

Portland, Oregon is also a smaller city than L.A., but its transit system is similarly sized and was built around the same time. Learning from Portland's success with dense, sustainable land use policies based on its transit system can guide L.A.'s planning strategy as it expands its own transit infrastructure.

Thanks to a 1970 Oregon state law, Portland is encircled by an "urban growth boundary," which restricts development and prevents sprawl. Moreover, a 1991 state planning rule requires urban development to outpace VMT growth; this naturally encourages public transit. So between 1996 and 2006, while the population increased 27 percent, VMT only grew 19 percent and transit ridership shot up 46 percent.

Portland's planning policies encourage denser development around transit stations and minimize vehicle traffic through a variety of mechanisms, including capping parking spots. Contrary to popular opinion that if you don't provide parking, they won't come, the Pearl District downtown has enjoyed [\\$3.4 billion in residential and commercial development](#) since opening in 2001.³⁴ As a result,

Portland residents travel 20 percent less distance, are twice as likely to take public transit to work, and seven times more likely to bike to work than the average US metropolitan resident.

Figure 6 compares the types of development around L.A. and Portland rail stations.³⁵ Evidently, L.A. has a preponderance of residential areas around stations, whereas Portland's stations are in much more mixed areas. Recall that L.A.'s unique urban geography is polycentric, and residents rarely live near where they work. Achieving Portland's transit-oriented development outcomes will require encouraging mixed development to flourish around the transit network, to reduce trip lengths while also making public transit the most convenient option. Some critics argue that constraining the supply of urban land for development will raise housing prices to the detriment of low-income residents, but [the data show otherwise](#), presenting no statistically significant correlation between Portland's urban growth boundary and higher housing prices.³⁶

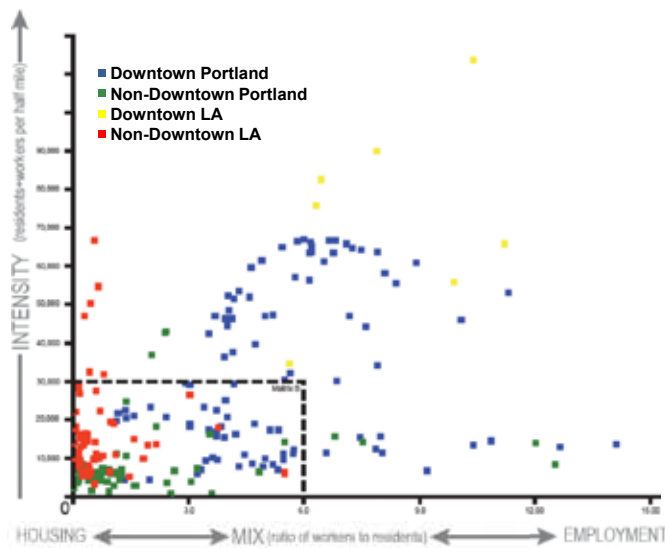


Figure 6: Comparison of Transit Oriented Development Between Los Angeles and Portland. Plot of density versus land use type around each transit station in L.A. and Portland. L.A.'s non-downtown cluster along the y-axis implies that most transit outside of downtown serves exclusively residential communities, even though L.A. workplaces are polycentric. Portland's mixed-use and dense development around its stations represents effective transit oriented development. Source: [Center for Transit-Oriented Development](#).

Fee-bates: From France to California

Throughout this report, we have alluded to state policies that advanced urban sustainability. California's smog reduction measures and Oregon's urban growth boundaries set a framework within which L.A. and Portland could reduce their emissions. In addition to pursuing policies bounded by city limits, cities can lead by example, and we conclude with a proposal for an L.A. pilot of a statewide policy for California that could actually move the market toward advanced vehicle adoption, complementing L.A.'s local EV infrastructure.

In 2007, France introduced its "Malus-Bonus" initiative, which either imposed a fee for cars below a certain fuel efficiency or disbursed a rebate for cars better than the standard; the fee or rebate—hence "feebate"—was stepwise proportional to the fuel efficiency. So the higher the fuel efficiency, the higher the rebate; the lower the efficiency, the higher the fee. The French model was wildly successful in greenhouse gas mitigation and played a large part in driving down emissions 11 percent to the lowest levels in the European Union; simultaneously, car sales climbed to their highest level since 1990. However, [the program was expensive](#), ultimately paying out \$1.2 billion by 2011 (during the same time France was dealing with the long-term economic recession), causing the French government to scale back the rebates.³⁷

California [dispatched a working group](#) to study the feebate concept in 2010, when the future of the state's vehicle emission standards was in question.³⁸ However, even though California's Clean Car regulations—mandating cleaner fuel and more zero-emission vehicle sales—have been upheld by the federal government, feebates are a complementary, not conflicting, policy. Between its Low Carbon Fuel Standard and emission benchmarks, California requires oil companies and automakers to minimize emissions from gasoline-powered vehicles. However, a feebate goes further than a standard, offering an even higher rebate for zero emission vehicles like EVs and consolidating incentives and fees into an elegant variable rate structure.^b Through the feebate

^b In fact, feebates and vehicle fuel efficiency standards (e.g., federal CAFE standards) can be shown to be mathematically equivalent. For example, a linear feebate with an appropriate pivot point is equivalent to a fuel efficiency standard with no credit trading across manufacturer fleets. However, in practice the feebate is a more dynamically responsive policy; e.g., banking and borrowing of credits is required to make a fuel standards temporally equivalent to a feebate outside of steady-state conditions.

mechanism, California can achieve its stated goal of zero-emission vehicles composing 15% of new sales by 2025. And by more carefully choosing the pricing scheme and offering different schemes for large and small cars, California can avoid France's pitfalls and design a revenue neutral feebate that does not hamper consumer choice.³⁹

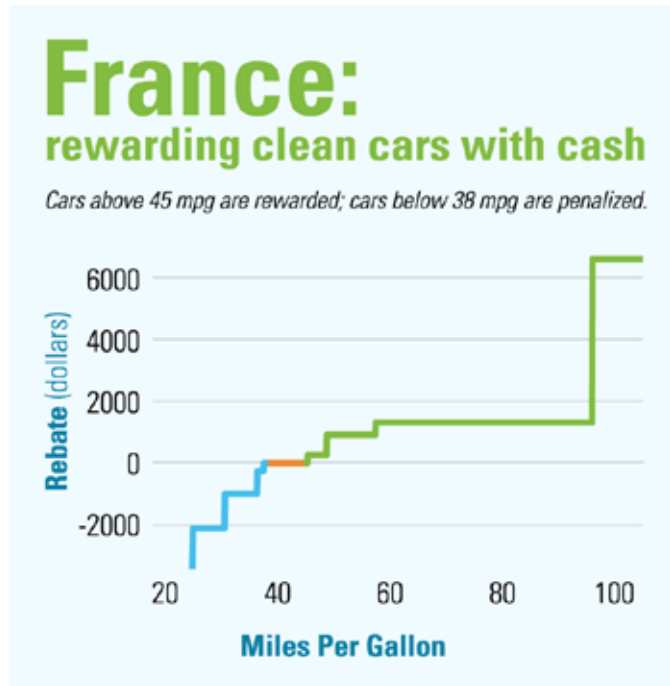


Figure 7: France Feebate Structure. Graph of Rebate (green) or Fee (red) vs vehicle fuel efficiency (equivalent to emissions/km). The mileage at which the rebate turns into a fee is known as a “pivot” and, together with the slope of the curve (equal to the rebate/fee per m.p.g.), can be chosen to make the program revenue-neutral. Data from [International Council on Clean Transportation](#).

The City of L.A. can lead the region in implementing an informative pilot for a statewide feebate program. Indeed a healthy competition between Southern and Northern California could help build political support statewide (so far, legislators are lukewarm); [the Bay Area already has plans](#) for a “Clean Vehicles Feebate Program.”⁴⁰ By speeding the transition to electric vehicles and bridging stationary and mobile energy, a feebate would help L.A. play to its strengths.

The Los Angeles of Tomorrow: A Transit Leader?

L.A. has made substantial progress toward curbing emissions in the transportation sector by regulating dirty trucks, alleviating traffic, supporting electric vehicles, and investing heavily in tomorrow's public transit. In doing so, L.A. has earned its place as an international environmental leader. Now it's time for the city to leverage insights from around the world to complete its transportation overhaul. L.A. should double down on congestion pricing and transit oriented development, and California can help speed electrification of the passenger vehicle with the right incentives. While careful measurement and in-depth planning are essential, it is down to L.A.'s policymakers to confront climate change with bold action.

Because once Angelenos glimpse their new city, they won't want the old one back.

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Opinion: Make Carbon Reductions the Goal

Through its innovative approaches to relieving traffic and enhancing clean transportation options, L.A. has made demonstrable progress toward curbing climate pollution from its transportation sector. Now the city's diverse transportation policy framework is nearing the end of its first decade in operation, making it possible to take a step back and collect lessons learned – and ensure that future activities aim even more ambitiously at ending dependence on fossil fuels.

While it's important to measure the impact of any activity, measurement often lacks context – and can imply progress toward a goal that wasn't necessarily the intended outcome. The challenge of measuring the climate impact of various transportation options is compounded by the fact that, historically, different transportation strategies have been measured in different ways: is it important to reduce vehicle miles travelled, or VMTs? Is vehicle fuel efficiency the best yardstick? Are figures for public transit use, by themselves, meaningful?

VMT measurements in particular are problematic. For example, Metro's projected annual VMT reduction of 208 million miles is like taking all the cars in L.A. County off the road for one day; this would be an underwhelming result for L.A. County's extensive transit investments.⁴¹ However, this estimate is likely conservative because Metro does not consider the higher land use density that surrounds transit lines and further reduces car travel. Instead, it estimates its VMT displacement figures **could more than triple** if it were to consider land use.⁴² Indeed, denser development can impact the electricity sector as well, increasing energy efficiency.⁴³ Only by developing a robust methodology to quantify benefits from land use and partition them among emission sources can we determine the full climate impact of these policies.

I would suggest that, moving forward, policies in public transit, traffic mitigation, and EV adoption should all be assessed using one common metric: The percentage reduction of citywide transportation sector emissions. Without a common standard, and careful and consistent measurement, L.A.'s transportation investments will turn into an incoherent policy potpourri.

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