UNDER EMBARGO UNTIL 9 DECEMBER AT 00:01 GMT

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New Research: Cities Seeking to Zero Out Emissions Must Do More than Embrace Electric Vehicles; Reaching Climate Targets Requires Compact Cities

Reducing climate emissions from urban transport to meet a 1.5-degree warming scenario can only be accomplished through a combination of electric vehicles and urban density, anchored by mass transit, cycling and walking.

NEW YORK (9 December 2021)— For the urban transportation sector—one slice of the climate-change equation—the road to keeping below 1.5°C global warming involves both compact cities developed for walking, cycling and public transit, as well as a rapid and strategic transition to electrified vehicles, according to new research released by the Institute for Transportation Development Policy (ITDP) and the University of California, Davis.

According to the report, “The Compact City Scenario—Electrified,” only these two policy changes in tandem will lower cumulative greenhouse gas emissions from urban passenger transport by 59 gigatonnes (Gt) CO_2-eq by 2050. This combination of policy changes would reduce the sector’s cumulative emissions by about 50% over the next 30 years (2020-2050), just below the amount needed to limit the impending damage that climate change can bring.

Extensive vehicle electrification only lowers emissions by a cumulative 44 Gt by 2050, while compact cities built around walking, bicycling and public transport will only lower emissions by 33 Gt over the same timeframe. But increasing urban density reduces the sheer quantity of cars on the road while alleviating the need for car infrastructure—benefits that bring emissions reductions in line with best-case scenarios for the future.

“We need electrification, but we will not meet our 1.5°C target if we focus on electric vehicles alone,” said Heather Thompson, CEO of ITDP. “We need to also focus on the fundamental equation of driving less, even if in electric vehicles, which still require a lot of resources like clean electricity. We need high-density development that provides better access to employment, education and services for families of all income levels without being dependent on cars. Walkable and cycling cities aren’t just better for the economy and the environment—they’re healthier and happier for everyone. We have the evidence, and we know what needs to be done: we need an integrated approach that includes both electrification and compact development. Cities must step up.”

At the Glasgow climate talks in November, electric vehicles (EVs) were embraced as a potential climate solution. A multilateral agreement—signed by both public and private sector institutions—pledged to transition to 100% zero-emission sales of new cars and vans by 2040 globally and by 2035 in "leading markets.” Fifteen countries also agreed to a separate pledge to work toward 100% zero-emission sales of new trucks and buses by 2040.

Urban passenger transport in 2015 represented approximately 10% of all of humanity's greenhouse gas emissions worldwide, but emissions have been increasing steadily as private vehicles have become easier to acquire in emerging economies. To meet the goals of the Paris Agreement and keep warming below 1.5°C to avoid catastrophic climate change, cumulative carbon dioxide equivalent emissions from urban passenger transportation must fall roughly by 54 Gt in the next 30 years relative to their current trend.

"Strategically, electric vehicles and compact cities make a great pair," said Thompson. "Compact cities could reduce our energy demand by 40%, making it easier to ramp up renewable electricity in time to meet our climate goals."

"Timing is key, especially over the next ten years," added D. Taylor Reich of ITDP, one of the report's lead authors. "Electric cars aren't predicted to really go mainstream until the early 2030s, but compact city policies are ready now. If we build public transit, cycleways and compact neighborhoods today, we can reduce the demand for fossil-fuel car ownership. Transit-oriented planning will pave the way for easier electrification, especially in rapidly growing cities."

Urban Transportation Scenario	**Cumulative Emissions, 2020-2050 (gigatonnes)**
Current trends	119
Compact cities, without electrification	86
Electrification, without compact cities	75
Maximum cumulative emissions 2020-2050 needed to meet Paris Agreement goals	**65**
Compact cities and electrification, combined	60

The new report also looks at the impact of these scenarios on the direct cost of urban passenger transportation. Developing compact cities—either with or without vehicle electrification—would lower all combined direct costs globally by as much as one third, from $15 trillion total in 2050 to $10 trillion. This includes costs to governments as well as consumers. You can see these savings play out in comparing the US, where people in the lowest-income brackets spend as much as 30% of household income on transportation, with the denser cities in the EU, where the same income brackets only spend about 7%.

"Electric cars coupled with zero-carbon electricity can virtually eliminate CO_2 emissions, but sales and stock turnover will take a long time to match policy goals. Further, studies have often ignored the impacts of building highways or manufacturing cars and batteries," said Dr. Lew

Fulton, co-director of the Sustainable Transportation Energy Pathways consortium at UC Davis and one of the report's lead authors. "With all that asphalt, steel and lithium, motor vehicles will not be truly zero-carbon until all these systems are fully decarbonized, which will also take a long time. Electrification strategies combined with greater urban uptake of buses, bicycles and footpaths is likely the fastest and most cost-effective overall strategy."

Transforming urban transportation

According to the report, one approach to reducing emissions from urban passenger transport lies with EVs. EV technology is improving rapidly, and although market shares are still very low, the right policies could promote rapid electrification of passenger fleets.

Full electrification of all vehicles combined with total grid decarbonization would, in theory, prevent all emissions from passenger transport. But electrification and grid decarbonization cannot feasibly replace 100% of internal combustion engine (ICE) vehicles by 2050.

Another approach to decarbonizing urban passenger transport is the promotion of compact cities built around walking, bicycling and public transport—the *High Shift* scenario. This approach to urban planning can dramatically reduce the demand for car travel, which will lower the infrastructure needs for cars—a significant driver of emissions for the sector. The *High Shift* scenario will also reduce the overall demand for electricity, making it easier to switch our grids to clean sources.

Both electrification and compact cities have enormous potential to decarbonize urban passenger transport. The report shows, however, that neither of those strategies alone is sufficient to reduce emissions to a level consistent with the broad strategies needed to limit global warming to 1.5°C. For that, electrification and compact cities must be combined—and other economic sectors, like manufacturing and electricity generation, must also be remade.

"It's ambitious to say we can phase out internal-combustion engines by 2040, and it's ambitious to say we can redesign cities so that more than half of travel is by walking, cycling or public transit," said Reich, "but these things are logistically and technologically feasible—all that's missing is the political will."

Progress is underway

Developing compact and dense urban centers requires policies addressing land use, walking and bicycling, public transit and disincentivizing car use. In compact, mixed-use cities, people live within a short distance of their daily needs, meaning they can walk or cycle to them. These cities also make public transit more efficient by having more destinations (homes, jobs and services) near stations and shorter distances between stations. Cities that have embraced these opportunities in land use policy include Kigali, Rwanda; Paris, France; Singapore; Portland, USA and Curitiba, Brazil.

High-quality footpaths, an extensive network of dedicated and protected bicycle lanes, and public bikeshare systems that integrate with public transit are also a primary focus. Cities that have deployed these components include Chennai, India; Bogotá, Colombia; Seville, Spain; Hangzhou, China and Mexico City, Mexico.

According to the new report, public transit—more than any other mode—makes the *High Shift* scenario possible. A massive increase in public transit compensates for more than half thedecrease in car travel, with the vast majority provided by large buses. Cities that have

boosted their public transit effectively include Seattle, USA; and Tehran, Iran and Jakarta, Indonesia.

“We know that a lot of folks want to jump into electric cars and drive off into the sunset, but the numbers are clear: electrification won’t solve the problem alone,” said Jacob Mason, ITDP’s director of research and impact and one of the report’s authors. “What the world needs now is the same energy and dedication applied to building compact cities. Walking, bicycling and public transit are just as important if we’re going to keep climate change below catastrophic levels.”

Graphics

Figure 3.4a from the report:

Of four scenarios for urban transportation, only one could limit warming by 1.5°C

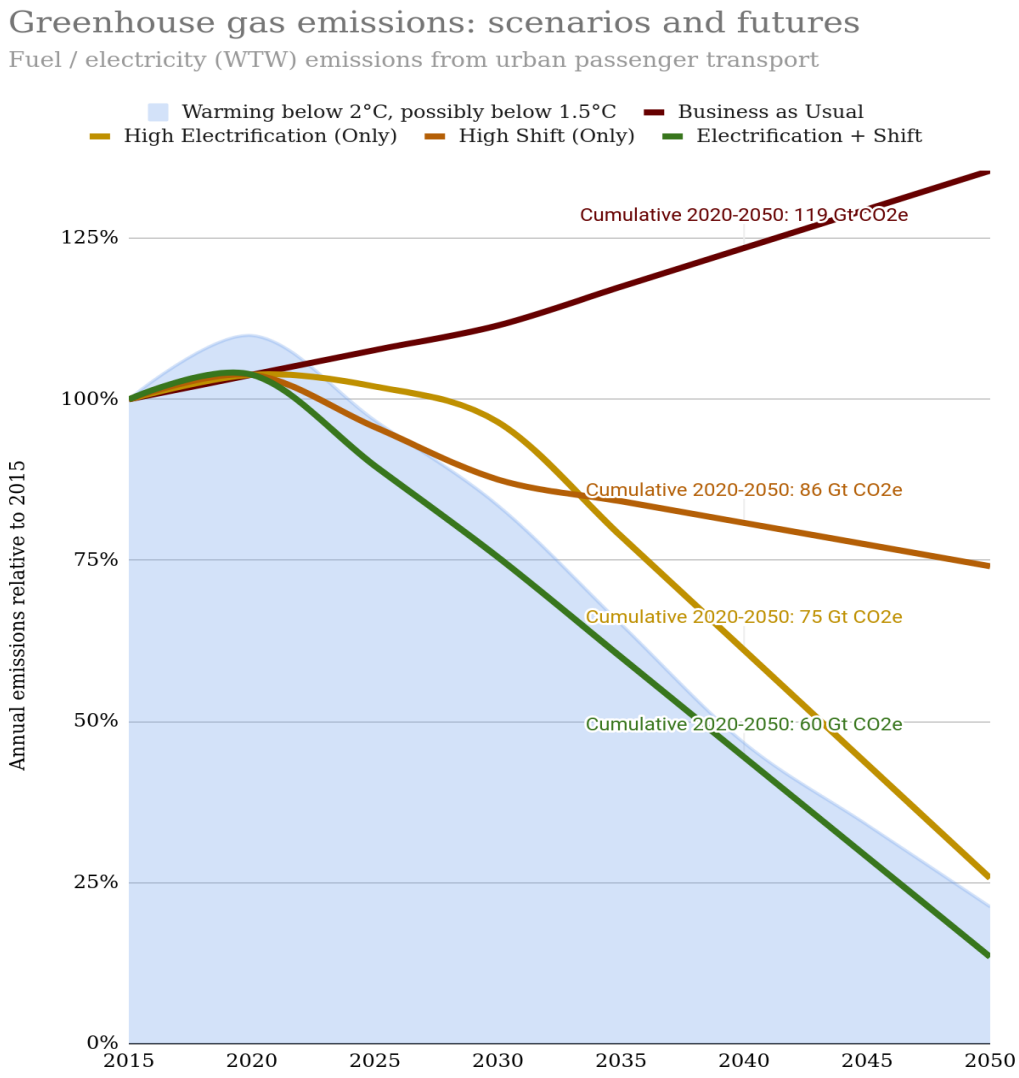


Figure 3.3 from the report:

Annual urban transportation carbon emissions for each scenario, split by vehicle, fuel and infrastructure

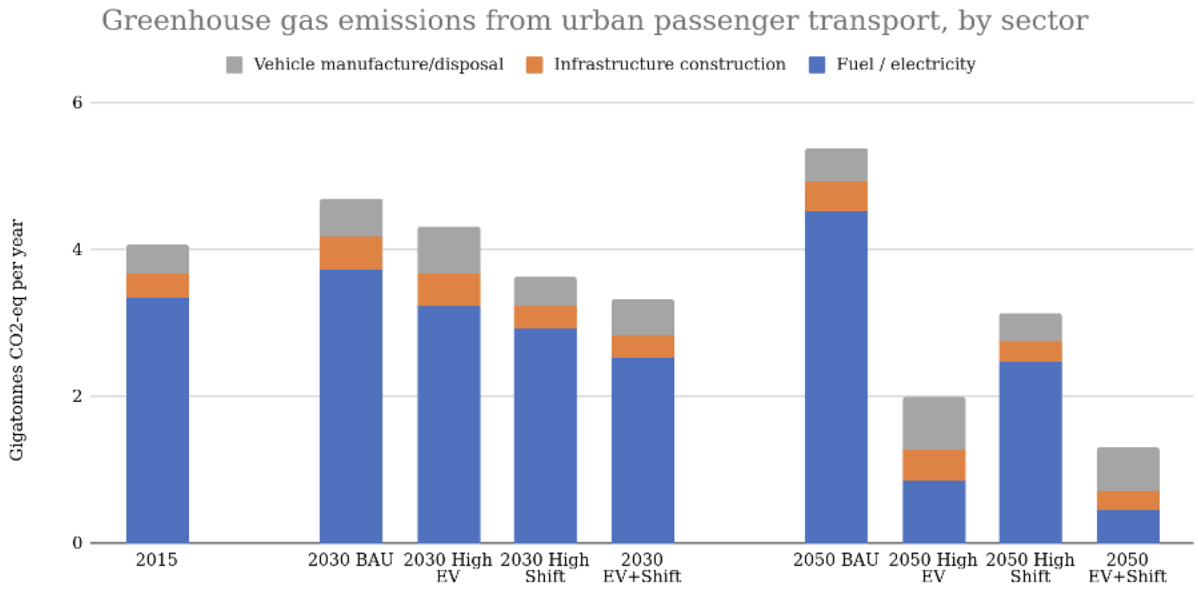


Figure 3.4e from the report:

Urban transportation carbon emissions for current and best scenarios, broken down by region and transportation mode

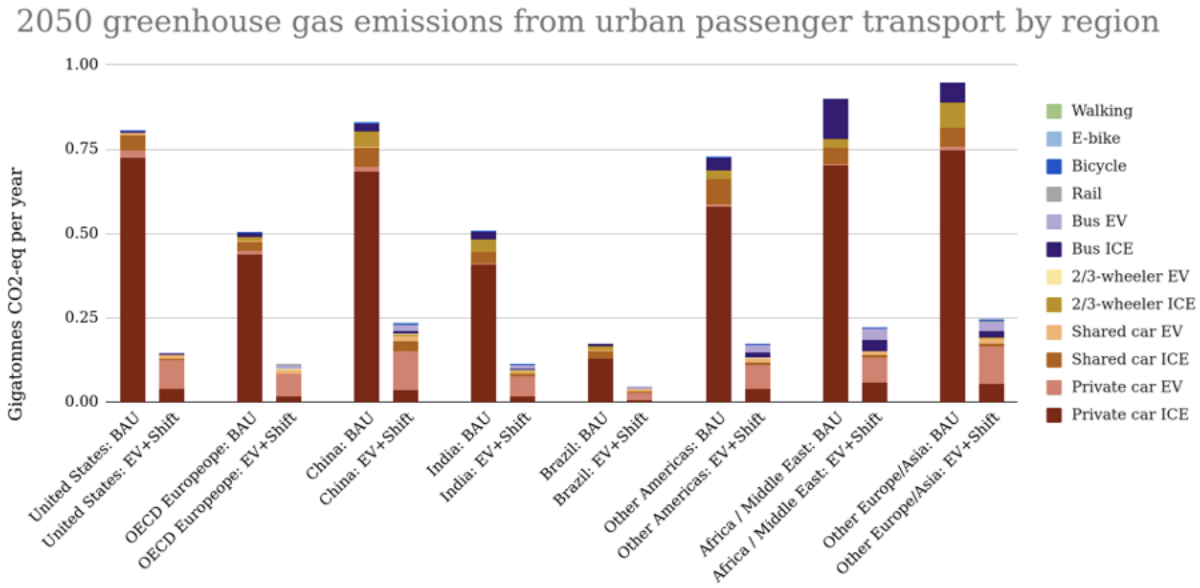
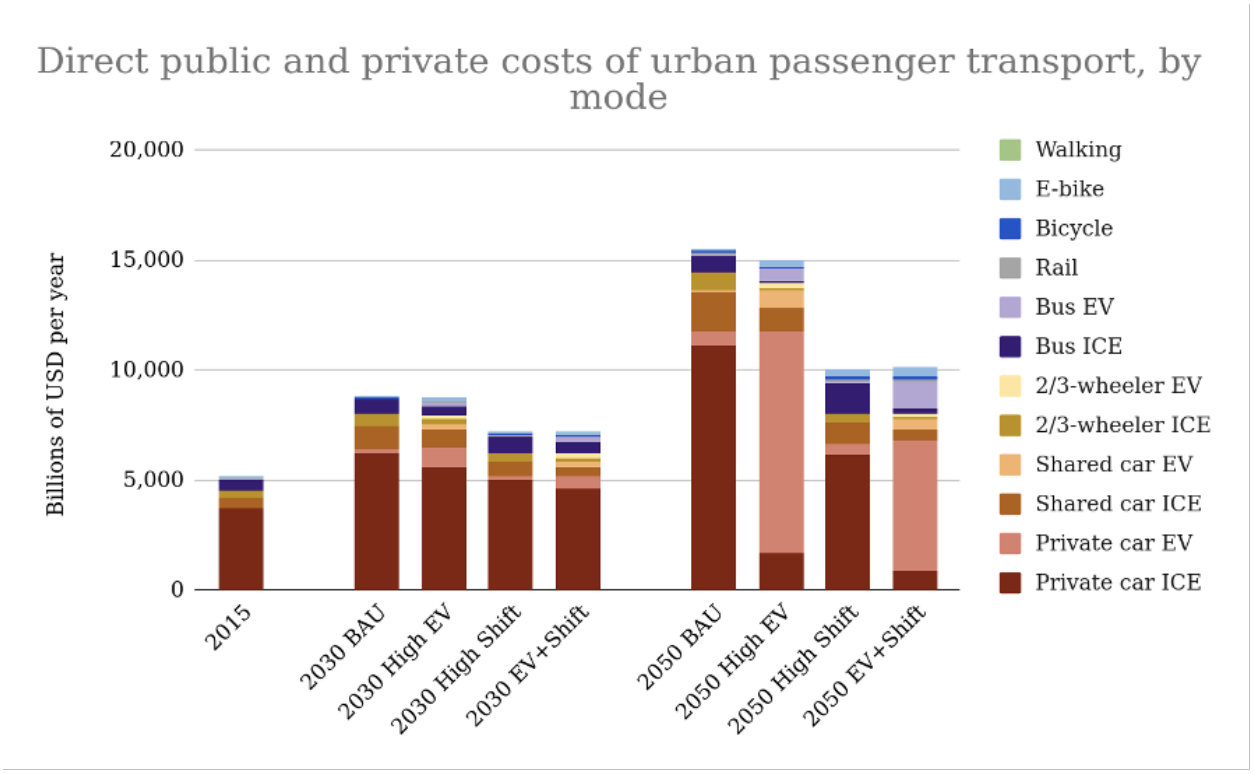


Figure 3.6a from the report:

Annual total direct costs of urban transportation for each scenario, broken down by transportation mode



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