Compact Cities Electrified: United States

Executive Summary

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New research from the Institute for Transportation and Development Policy and the University of California, Davis, finds that the United States could feasibly reduce public-sector expenditures on urban transport at the local, state, and federal levels by a cumulative $2 trillion through 2050 by using a combination of strategies to support vehicle electrification, compact city planning, and modal shift toward walking, cycling, and public transit. Furthermore, only the combination of these strategies, not any strategy alone, will be sufficient to approach the country's commitments to reduce carbon emissions in urban passenger transport.

This study investigates four possible scenarios for urban passenger transport in the US:

- ***Business as Usual:*** the US's current trend, including the effects of the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA).
- ***Electrification (Only):*** The fastest feasible replacement of internal-combustion vehicles with electric ones, including the EPA's 2023 proposed emissions standards.
- ***Mode Shift (Only):*** The fastest feasible transformation of city planning priorities in favor of compact land use and public transport, walking, and bicycling.
- ***Electrification + Shift:*** The combination of the previous two scenarios.

The estimated requirements to achieve each scenario and the cumulative public-sector expenditure entailed are shown in Figure A.

In addition to cost savings, the *Electrification + Shift* scenario would reduce electricity consumption by 300 billion KwH per year by 2050 compared to *Electrification (Only)*. Qualitatively, this scenario would improve road safety, promote economic inclusion of marginalized groups, and reduce air pollution.

Infrastructure requirements and direct public costs by scenario

	Percent of new light-duty vehicles that are electric	Cumulative lane-miles of roadway built 2015–2050	Cumulative track-miles of metro rail built 2015–2050	Cumulative lane-miles of BRT built 2015–2050	Cumulative lane-miles of protected bikeway built 2015–2050	Cumulative public-sector expenditure on urban passenger transport 2015–2050
2015 Baseline	2%					
2050 Business as Usual	50%	350,000	160	240	10,000	$13 trillion
2050 Electrification (Only)	100%	350,000	160	240	10,000	$13 trillion
2050 Mode Shift (Only)	50%	0	3,300	26,000	190,000	$11 trillion
2050 Electrification + Shift	100%	0	3,300	26,000	190,000	$11 trillion

FIGURE A

The research also measures greenhouse gas emissions from urban passenger transportation in each scenario. The results add to a growing body of evidence[2] and show that achieving the US's Paris Agreement commitments will require both electric vehicles and a change in travel patterns. It is insufficient for Electrification or Mode Shift to occur at the fastest possible rate independent of each other—it is only by maximizing both of these complementary strategies that the US can reduce emissions fast enough to even approach a level consistent with holding global warming below 1.5°C (represented by the blue area in Figure B).

COVER PHOTO: People cycling and walking on Brooklyn Bridge sidewalk. **SOURCE:** William Perugini via Shutterstock

2 Georgetown Climate Center (2021), Issue Brief: Estimating the Greenhouse Gas Impact of Federal Infrastructure Investments in the IIJA; Climate Center and UC Davis (2023), Achieving Zero Emissions with More Mobility and Less Mining.

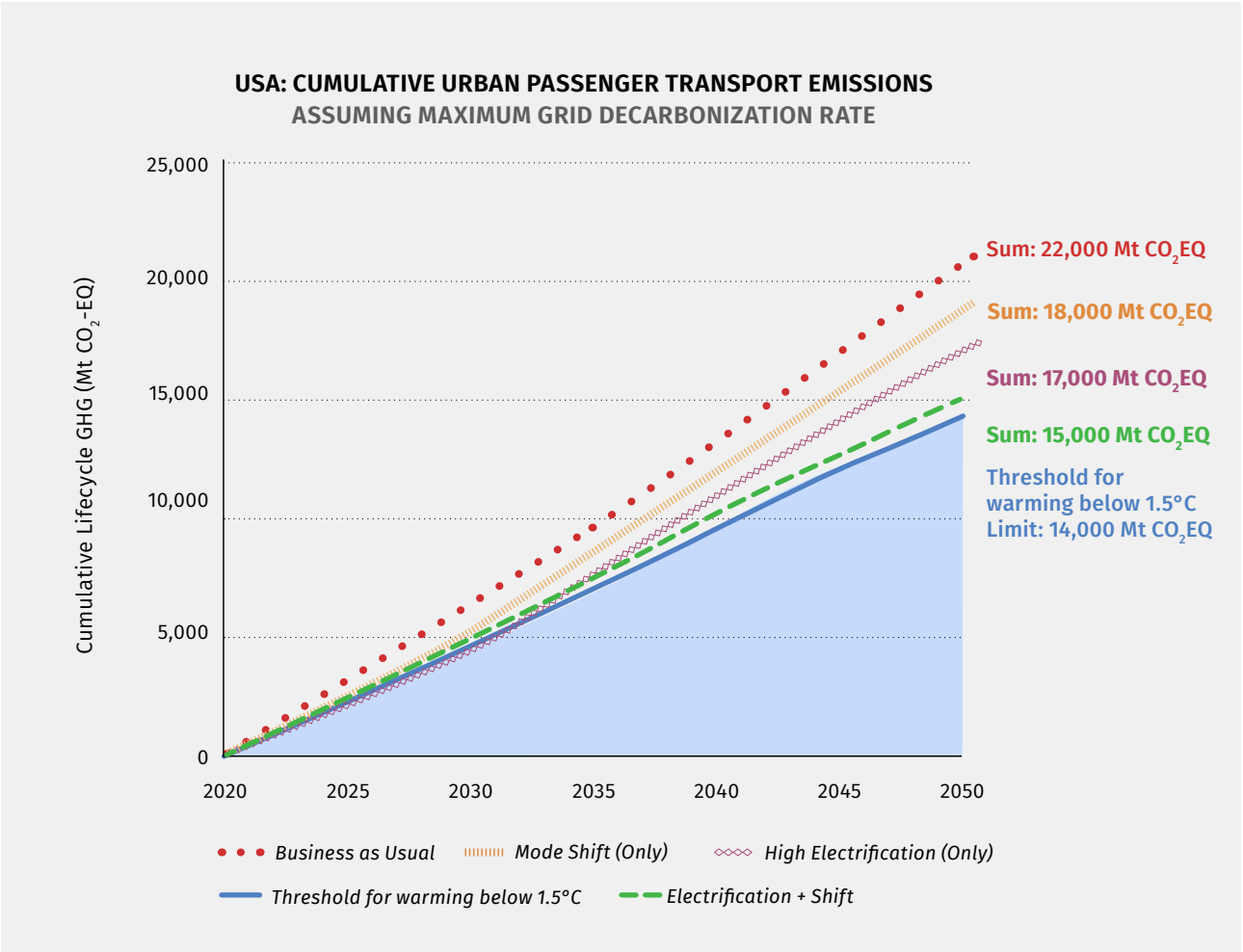

FIGURE B
Greenhouse gas emissions by scenario

To achieve the *Electrification + Shift* scenario, the US must restructure transportation and land-use policies to prioritize the movement of people rather than vehicles. Such restructuring will entail incentives and mandates for vehicle electrification, construction of compact mixed-use cities, and reallocation of street space and transportation funding from private motorized vehicles to walking, cycling, and public transport. In all scenarios, most travel will still be made by car, but the *Electrification + Shift* scenario will offer Americans a wide range of travel options using clean, efficient vehicles. This scenario is not an unprecedented revolution: it is a return to a tradition of people-focused city-building that has proven successful throughout most of the country's long history and around the world.

With less money spent building roads, governments will have more resources to devote to other uses or to lower taxes. And with less money spent on fuel, Americans will have the freedom to invest more in other areas of their life. By protecting our planet from the worst threats of climate change, we will make it possible for the country to prosper long into the future.

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