COMMENTS ON CEQ's NEPA GUIDANCE
on Consideration of Greenhouse Gas Emissions and Climate Change

These comments are in response to the Council on Environmental Quality's January 9, 2023, Request for Comment Docket Number, CEQ-2022-0005, regarding interim Guidance on Consideration of Greenhouse Gas (GHG) Emissions and Climate Change under the National Environmental Policy Act (NEPA). These comments have been prepared by Robert Yuhnke and Michael Replogle and are submitted on behalf of the Coalition for Smarter Growth, Elders Climate Action, Equiticity, Institute for Transportation and Development Policy, National Association of City Transportation Officials, RMI, Sierra Club, Transportation for America, the Southern Environmental Law Center and our millions of members.

INTRODUCTION

Transportation in the U.S. is –
1) the Nation's largest source of GHG emissions;
2) the Nation's economic sector where GHG emissions are growing the fastest;
3) the economic sector where federal investments contribute more to shaping future sector development than any other sector of the national economy;
4) the Nation's largest source of air pollution that disproportionately harms the health and economic well-being of more than 60 million Americans who live in close proximity to heavily trafficked highways, ports, airports, warehouses and intermodal terminals; and
5) the target for a large increase in federal infrastructure investment.

In its 2021 draft GHG Inventory, EPA reports that 1,794 MMT of CO2eq was emitted from the transport sector, increasing 13.8% y-o-y from 2020 to 2021, which extends a long-term trend of annual increases in CO2 emissions from transport, except for 2020.[1] Growth in CO2 emissions

[1] Transportation End-Use Sector. Transportation activities accounted for 38.6 percent of U.S. CO2 emissions from fossil fuel combustion in 2021, with the largest contributors being light-duty trucks (37.0 percent), followed by

reflected both a rebound in post-COVID travel demand, and a failure of automakers to improve gas mileage, which remains at 25.4 mpg.[2]

Vehicle carbon emissions dropped by just 2 grams, a mere 0.6%, driven by a small increase in sales of zero emission electric vehicles and plug-in hybrids. Only 4% of 2021 new vehicle sales were electric or plug-in hybrids. EV sales rose to 5.8% in 2022.[3] GHG emission reductions from improvements in fuel efficiency are nowhere near enough to offset the increase in vehicle travel.

Using the IWG 2021 interim Social Cost of Carbon ($51/tonne), CO2 emitted from the U.S. transport sector in 2021 represents $91.5 billion in loss and damage. Using more recent estimates that include some types of losses not included in the 2021 IWG formulation and lower discount rates, U.S. EPA estimates transport emissions in 2020 caused $340/tonne in loss and damage, and will cause $380/tonne in 2030, totaling more than $1.5 trillion annually.[4] As CO2 emitted from transport continues to grow, GHG emissions from the transport sector play a critical role in contributing to the climate crisis.

The U.S. committed to reverse this trend within the next eight years as part of the "Long-term Strategy"[5] (LTS) submitted by the U.S. at COP 26 as our "nationally determined contribution" under the U.N. Framework Convention on Climate Change. The LTS commits to reducing GHG emissions by 50-52% from the 2005 baseline by 2030, which is in alignment with the analysis by the Intergovernmental Panel on Climate Change showing that 2005 GHG emissions must be cut

---

freight trucks (23.5 percent) and passenger vehicles (20.6 percent), and.[as in original.] Annex 3.2 presents the total emissions from all transportation and mobile sources, including CO2, CH4, N2O, and HFCs.

In terms of the overall trend, from 1990 to 2021, total transportation CO2 emissions increased due, in large part, to increased demand for travel a result of a confluence of factors including population growth, economic growth, urban sprawl, and low fuel prices during the beginning of this period. From 2020 to 2021, transportation CO2 emissions increased 13.8 percent, largely reflective of a rebound in travel activity as COVID-19 pandemic restrictions were eased. While an increased demand for travel has led to generally increasing CO2 emissions since 1990, improvements in average new vehicle fuel economy since 2005 have slowed the rate of increase of CO2 emissions. In 2021, petroleum-based products supplied 94.6 percent of the energy consumed for transportation, primarily from gasoline consumption in automobiles and other highway vehicles (53.2 percent), diesel fuel for freight trucks (24.5 percent), jet fuel for aircraft (10.2 percent), and natural gas, residual fuel, aviation gasoline, and liquefied petroleum gases (6.7 percent). The remaining 5.5 percent is associated with renewable fuels (i.e., 17 biofuels). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021 – Executive Summary (epa.gov), p. ES-10 (downloaded March 2, 2023).

[2] The 2022 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975, Executive Summary (EPA-420-S-22-001, December 2022).

[3] U.S. EV Sales Jolted Higher in 2022 as Newcomers Target Tesla - WSJ (Jan. 6, 2023).

[4] "Report on the Social Cost of Greenhouse Gas Emissions," Table ES-1 (external review draft, U.S. EPA, September 2022) available at: https://www.epa.gov/system/files/documents/2022-11/epa_scghg_report_draft_0.pdf. *See* Kikstra, Jarmo S.; Waidelich, Paul; Rising, James; Yumashev, Dmitry; Hope, Chris; Brierley, Chris M. (6 September 2021). "The social cost of carbon dioxide under climate-economy feedbacks and temperature variability". *Environmental Research Letters. 16 (9): 094037.*

[5] The Long-Term Strategy of the United States - Pathways to Net-Zero Greenhouse Gas Emissions by 2050 | UNFCCC. Available at https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf. ("LTS").

in half by 2030 to avoid the severe disruptions and economic losses that will be caused by warming more than 1.5° C above the global pre-industrial baseline.

To prevent the massive destruction that will accompany warming greater than 1.5° C, and fulfill its LTS, the U.S. must reduce GHG emissions from ±5550 MMT CO2eq in 2021 to about 3300 MMT by 2030. Of that 2250 MMT economy-wide aggregate reduction, we estimate that CO2 emitted from transportation must be reduced from 1800 MMT to at least 1200 MT or less in 2030.

NEPA and CEQ must play a critical role in guiding agency plans, programs, and actions to ensure that the U.S. LTS is implemented. We urge CEQ to issue NEPA guidance governing decisions by the four agencies working on the U.S. *Blueprint to Decarbonize Transportation*[6] (Departments of Transportation, Energy, Housing and Urban Development and U.S. EPA) to ensure that the policies governing direct federal investments in the transport sector, and federal grants for transportation programs and projects that match and stimulate State and local investments in the transport sector, and vehicle emission standards are designed and implemented to achieve the GHG reductions needed from transport to meet the U.S. NDC.

Federal agencies, including the Federal Highway Administration, Federal Transit Administration, Federal Aviation Administration, Surface Transportation Board, Federal Maritime Commission, Coast Guard, U.S. Army Corps of Engineers, National Highway Traffic Safety Administration, are responsible for the indirect and cumulative impacts of carbon fuel combustion in mobile sources operated on-road, off-road during construction and maintenance of transportation facilities, on rails, in ports and at airports approved or funded through federal transportation programs. But these agencies do not consider the cumulative direct and indirect impacts of their respective programs on urban development, which in turn have indirect impacts on GHG emissions, climate, and on the health of their neighbors in nearby communities.

To date, federal transportation agencies have generally failed to use their transportation planning authority, project approvals, investments, or grant-making authority to contribute to reducing GHG emissions, restoring a healthy environment for communities that bear an excessive burden on community health from exposure to transportation pollution, or helping shape community development to create a zero emission economy. This comment asks CEQ to issue Guidance that ensures the requirements of NEPA are implemented so that the federal role in transportation planning, development of transportation programs, approval of transportation projects, and federal investments in State and local transportation actions contribute to solving the climate crisis, while also enhancing the quality of the human environment in communities that bear a disproportionate health burden from exposure to pollutants other than CO2 emitted from the transport sector.

[6] "The U.S. National Blueprint for Decarbonization of Transportation," DOE, January 10, 2023 ("*Blueprint*") (https://www.energy.gov/sites/default/files/2023-01/EERE-Decarbonization-Transportation-Report-508.pdf).

I. EXECUTIVE SUMMARY.

These comments focus on the need for CEQ guidance to –
1) focus transportation agency decisions on the urgent need to reduce aggregate GHG emissions from the transport sector to meet GHG reduction targets set by the U.S. "nationally determined contribution" under the U.N. Framework Convention on Climate Change;
2) establish a NEPA framework to ensure that agencies responsible for the design and operation of the nation's transportation system develop a coherent strategy for achieving national GHG reduction targets;
3) direct FHWA together with States that prepare NEPA reviews of infrastructure investments to consider the impacts that increased highway capacity has on increasing vehicle miles travelled that contributes to the growth in CO2 emissions from on-road vehicles, and creating vehicle-dependent development that creates barriers to a net-zero economy; and
4) provide clear NEPA criteria that recognizes the critical role that transportation decisions played in creating the excessive health burden borne by more than 60 million Americans in frontline communities near heavily trafficked highways, ports, airports, railyards and intermodal facilities, and the need for corrective actions to reverse the injustices of the past to enhance and restore a healthy environment for at-risk communities.

To demonstrate the need for proposed Guidance, we submit examples and case studies demonstrating agency failure to --
1) account for significant emissions of GHGs and other pollutants emitted from combustion of carbon fuels that result from agency actions that promote the kinds of development that increase VMT, increase CO2 and other pollutants, and make communities dependent on personal vehicles rather than zero polluting alternative modes of mobility; and
2) quantify and disclose the health impacts that pollutants emitted from transportation facilities have on community health, and consider the community health benefits of alternatives that promote zero emission vehicles or minimize the need for personal vehicles.

A. Guidance Must Focus Agencies on Ending Climate Warming.

CEQ's interim Guidance focuses on estimating and reporting GHG emissions associated with federal agency actions, with the emphasis on alternatives that merely avoid or minimize adding more GHG emissions. Avoiding increased emissions does not avoid or mitigate the climate crisis.
U.S. climate policy is committed to reducing GHG emissions to "net-zero" by 2050, with half that reduction by 2030. To effectively prevent the climate crisis from becoming a climate catastrophe CEQ Guidance must direct agencies to align their policies and programs with those national policies and targets, and develop programs and measures to provide a framework for agency decisionmaking to ensure that investments, grants and approvals will collectively reduce the contribution from transport to GHG emissions and climate, and to hazardous pollutants and community health.

Agencies have become accustomed to viewing NEPA through the blinders imposed by the last two decades of NEPA practice where this law has not been used to tackle broad, large scale environmental challenges. The focus has been limited to slowing environmental degradation from the development of resources and infrastructure. But that narrow approach has not provided an effective response to the climate crisis. Each action is too small a piece of the puzzle to provide a lever to move the needle. NEPA must be applied as a guide for developing and implementing national policies and programs to ensure that every action contributes to meeting the climate challenge. Limiting NEPA to each separate action without using each of those actions to achieve the aggregate GHG reduction targets needed to avoid worsening climate disasters, will keep NEPA from serving any useful function in the climate context.

GHG emissions from the transport sector continue to grow, offsetting reductions achieved in other sectors of the economy. Yet these massive global impacts from GHGs emitted from the U.S. transportation system are not the focus of cumulative impact analyses performed for transportation programs and projects, nor the focus of alternatives analysis or mitigation strategies designed to reduce GHG emissions from transportation to stop the warming and stabilize the climate.

Commenters ask CEQ to add specific Guidance that focus transportation agencies on the need to implement their obligations under NEPA to enhance and restore environmental quality by rapidly reducing CO2 to "net zero" to stabilize the climate and stop further devastation from the impacts of climate warming. We analyze NEPA authority to identify the basis for Guidance that requires agencies to develop "programs and measures" to enhance and restore by describing how the emission reduction targets described by the climate science, and adopted as national policy, will be achieved within each agency's area of responsibility.

To focus agency decisionmaking on achieving nationally committed GHG reduction targets, we ask that CEQ give meaning to the statutory purpose of "enhancing the quality of the Nation's environment," and the requirement in 40 CFR § 1502.1(a) that an EIS inform decisionmakers of "reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment" by providing clear guidance directing agencies to –

1. Meet their obligation under 40 CFR §§ 1500.3(a) and 1507.2(f) to "fulfill the requirements of E.O. 11514, section 2" which requires that "Agencies shall develop programs and measures to protect and enhance environmental quality and shall assess progress in meeting the specific objectives of such activities" by requiring programmatic plans and policies that describe how each agency will deploy its statutory authorities and resources to achieve the aggregate GHG reduction targets set by executive orders and the U.S. NDC within the timeframe for achieving those targets. To ensure that "programs and measures" developed to comply with the duty established by E.O. 11514 to "protect and enhance," agencies with authority to approve or fund transportation programs and projects must develop programs and measures designed to reduce GHG emissions to meet the NDC targets, i.e., reduce CO2 at least 50% by 2030 and achieve net zero CO2 by 2050.

2. Define “purpose and need” for any policy, program or action that involves the emission of GHGs to include achieving the GHG emission reduction target identified in that agency’s programmatic assessment of the GHG reductions needed to achieve the U.S. LTS.

3. For the purpose of considering alternatives that “minimize or avoid” the adverse impacts of climate warming, define “alternative” as any “investment, service, facility, technology or operating policy, or combination thereof, that meets a need for movement of people or goods while reducing CO2 emitted from the operation of a transportation facility 50% from the 2005 baseline by 2030, and to net zero CO2 by 2050.”

4. Define “mitigation” as any measure that could be implemented in the design, operation, construction or maintenance of any facility to implement the programs and measures adopted pursuant to E.O. 11514 to reduce GHG emissions to meet the NDC targets established by U.S. commitments under the U.N. Framework Convention.

B. Transportation Impacts on Public Health Are Largely Ignored in Practice.

As the largest source of pollutants emitted from the combustion of petroleum fuels, the transport sector is not only the largest source of GHG emissions in the U.S. For Americans living or working in the urban environment, pollution from transportation sources is the most significant cause of the adverse health effects associated with exposure to air pollution.

Transportation decision makers fail to investigate and disclose the cumulative impacts on public health caused by pollutants emitted from transportation facilities. Community health is harmed by human exposure to the entire array of pollutants emitted from the combustion of carbon fuels in mobile sources, including fine particles (PM), nitrogen oxides (NOx), carbon monoxide (CO), and the toxic air pollutants benzene, aldehydes, 1,3 butadiene, PAHs and metals in the fuel. Community exposures to these pollutants are recognized in the public health research as a major cause of adverse health outcomes for at-risk populations. But analysis of community exposure to the full array of pollutants emitted from transportation sources is not performed, and consideration of the impact of exposures on community health is universally missing.

Absent from EISs is discussion of alternatives designed to protect communities from exposures to the total mix of pollutants emitted from multiple sources, including both mobile sources and other sources in the urban environment. Also missing is consideration of alternatives and mitigation designed to “enhance and restore” environmental quality by reducing community exposures resulting from past decisions in addition to protecting communities from the adverse health outcomes that would result if a new project increases the exposures that harm community health.

We provide case examples of NEPA decisions where impacts on community health were raised and not considered, or were analyzed for the increased contribution from an individual project, but not considered with respect to the cumulative impact on community health. Based on these case histories, we propose Guidance to ensure that agencies consider 1) the cumulative impact of all the pollutants emitted from transportation facilities, 2) the cumulative health impact of exposure to all pollutants from transportation sources and other sources that

contribute to the health burden borne by at-risk communities, and 3) evaluate alternatives and mitigation designed to minimize or eliminate those impacts.

C. Establishing Clear Criteria Requiring Transportation Agency Consideration of Transportation Decisions on VMT, Community Development.

FHWA has routinely failed to consider the role that expanded highway capacity plays in promoting growth in vehicle miles travelled (VMT) which is a major contributor to the annual increase in GHG emissions from on-road vehicles. Even where the issue has been raised by credible experts, FHWA has refused to apply available modeling tools to assess this impact. Adding highway capacity rather than investing in low emission alternatives also contributes to auto-dependent patterns of develop that make transit investments less effective, and deprive residents of access to lower cost and less polluting transportation options.

We review the literature and highlight specific areas where Guidance is needed to ensure compliance with NEPA to consider the indirect consequences of highway investments. We highlight the ways in which EISs prepared for specific projects must disclose and acknowledge how the facility will stimulate the kinds of development that contribute to increased vehicle use, increased fossil fuel combustion, and increased emissions of both climate forcing pollutants and pollutants that impair human health. We propose additional Guidance to ensure that agency obligations under NEPA are met.

II. Climate Science and U.S. Policy Require Reducing GHG Emissions to Net-Zero, Not Simply Avoiding More Emissions.

EPA's National GHG Emission Inventory makes clear that CO2 emissions from transport are the most significant contributor to the effects of climate warming, including harm to public health, disruption of the global food supply, displacement of communities from extreme flooding, wildfire, and depletion of water supplies, loss of forest resources destroyed by wild fire, the disruption of natural systems such as depletion of water supplies, the bleaching of coral reefs from warming oceans and the collapse of the marine web of life from ocean acidification, endangering the survival of species, sea level rise and other effects of GHG pollution.

A. Net-Zero Emissions Must be Achieved as Soon as Possible to Stop the Warming, Stabilize the Climate and Protect Public Health and the Economy.

The science is clear that to achieve the statutory purposes of NEPA, the warming must stop. To stop the warming, the climate will need to be stabilized by achieving net-zero as soon as possible.

The IPCC provided clear guidance in its 2018 report that to stop the warming and stabilize the climate, the economy must transition to a zero carbon (CO2 and methane) emission energy system, and forests must be expanded to extract CO2 from the atmosphere. Climate stability can be achieved only by reducing GHG emissions to net-zero.

> To stabilize global temperature at any level, 'net' CO2 emissions would need to be reduced to zero. This means the amount of CO2 entering the atmosphere must equal the amount that is removed. Achieving a balance between CO2 'sources' and 'sinks' is often referred to as 'net zero' emissions or 'carbon neutrality'.[7]
>
> Limiting warming to 1.5°C implies reaching net zero CO2 emissions globally around 2050 and concurrent deep reductions in emissions of non-CO2 forcers, particularly methane (high confidence).[8] Such mitigation pathways are characterized by energy-demand reductions, decarbonization of electricity and other fuels, electrification of energy end use, deep reductions in agricultural emissions, and some form of CDR [carbon dioxide reduction] with carbon storage on land or sequestration in geological reservoirs.[9]

Zero GHG emissions to stabilize the climate must be achieved sooner than later to minimize the losses of lives, crops, fisheries, forests, property, and disruption of natural systems associated with devastating warmer climate effects. Zero emissions cannot be achieved without transforming transportation which is the largest source of GHG emissions.
The latest IPCC modeling report (AR6, 2021) concludes based on the latest climate data and updated modeling that –

> Under the five illustrative [GHG emissions] scenarios, in the near term (2021-2040), the 1.5°C global warming level is very likely to be exceeded under the very high GHG emissions scenario (SSP5-8.5), likely to be exceeded under the intermediate and high GHG emissions scenarios (SSP2-4.5 and SSP3-7.0), more likely than not to be exceeded under the low GHG emissions scenario (SSP1-2.6) and more likely than not to be reached under the very low GHG emissions scenario (SSP1-1.9).[10]

The opportunity to stay below 1.5°C and to prevent the additional devastation that such level of warming will cause, has been frittered away by inaction and delay. At the current global mean temperature, the climate has warmed enough to endanger public health, cause devastating destruction of homes and businesses, loss of life and the disruption of natural systems by extreme floods, drought, wildfires, hurricanes, and tornadoes. The harm we will experience above 1.5°C will be significantly greater.

But the IPCC offers the hope that "for the very low GHG emissions scenario (SSP1-1.9), it is more likely than not that global surface temperature would decline back to below 1.5° C toward the end of the 21st century, with a temporary overshoot of no more than 0.1° C above 1.5° C global warming."[11] That hope turns on cutting global CO2 emissions in half by 2030, and to net-zero by 2050 along with large reductions in non-CO2 climate forcers such as methane.

---

[7] **Global Warming of 1.5º C, Chapter 2, FAQs.**
[8] Methane (CH4, i.e, unburned natural gas) is 20 times more powerful than CO2 as a climate forcer.
[9] Id., Executive Summary, .
[10] Climate Change 2021, Summary for Policymakers, B.1.3. (available at IPCC_AR6_WGI_SPM.pdf.)
[11] *Id.*

The climate science identifies quantitative benchmarks for preventing the worst harm from climate warming that NEPA was enacted to prevent. The science makes clear that current emissions, if continued into the future, will raise the global temperature more than 2^{O} C above the pre-industrial background, and contribute to a horrific world inhospitable to human civilization.

The IPCC AR6 Working Group II report provides a summary of both observed and projected impacts of climate warming on global systems, resources and species.[12] In Appendix I we offer a summary of some of the Climate science that estimates the impacts of warming on wildfire destruction of U.S. forests, an impact not discussed in detail by the IPCC Report on monetized in the IWG Social Cost of Carbon.

The impacts of warming on forests demonstrates how each additional ton of CO2 from transportation sources will, in addition to the costs identified in the Social Cost of Carbon (SCC), impose on human communities the costs and consequences of rapidly widening impacts of wildfire, among other consequences not included in the SCC calculation. Small increments of warming exacerbate the conditions that contribute to wildfire, expand the scope of destruction caused by fire, cost lives, increase the loss of forest resources, incinerate communities destroying homes, businesses, infrastructure and community resources such as schools, water supplies, sewage treatment systems, medical facilities, and disrupting the social and economic well-being of millions of Americans.

Warming and acidification together are also contributing to a rapid collapse of the marine web of life, contributing to the loss of fisheries, loss of jobs, loss of protein sources in the human food supply, and reduction in the capacity of the oceans to serve as a CO2 sink.

To prevent the loss of life, minimize damages to property and resources, and protect health and natural systems, the U.S. must reduce GHG emissions from more than 5,550 MMT annually in 2021 to net zero by 2050. To engage the NEPA process to achieve the emissions reductions needed to avoid or minimize these impacts, we submit requested revisions to CEQ's Interim Guidance .

III. CEQ Guidance Must Be Revised to Direct Transportation Agencies to Integrate GHG Reduction Targets into Decisionmaking.

The fact that CO2 emitted from transport continues to grow year over year, that agencies with responsibility for supervision of the transport system have not identified the root causes of this growth in emissions or developed strategies to stop and reverse this growth, demonstrates that NEPA as currently applied to the transport sector is not effectively requiring agencies to develop policies, programs and measures designed to prevent the impending climate disaster. Simply put, NEPA is failing to meet the climate challenge.

[12] Climate Change 2022: Impacts, Adaptation and Vulnerability (IPCC, Feb. 27, 2022), available at https://search.yahoo.com/search?fr=mcafee&type=C211US739D20170311&p=IPCC+AR6+WGII%2C.

Gus Speth, CEQ chairman under President Carter, summarized that failure:

> [I]n this snapshot of decades, we find a federal government planning for, guiding, supporting, and encouraging massive fossil fuel use despite tragic consequences easily foreseen and avoided. *** Actions by the [federal government] defendants that have perpetuated reliance on fossil fuels have resulted in the release of a massive, and dangerous, amount of CO2 emissions since 1960. Cumulatively, the United States has emitted more CO2 than any other nation, and annually, the United States remains the second largest emitter in the world. ***
> For decades:
>
> a. The defendants have understood both that the dangers of climate change are real, present, and intensifying and that they are caused predominantly by burning fossil fuels.
> b. The defendants have understood how climate change will harm the nation and especially youth plaintiffs and future generations.
> c. The defendants have understood there are alternative national energy system pathways that would provide greater protection and safety for the nation and our people.
>
> Notwithstanding these understandings, the defendants have acted routinely and consistently, and continue to do so, to promote fossil fuels and thus to cause irreversible climate danger, a pattern that can only reflect a deliberate indifference to the severe impacts that will follow---impacts to be endured by youth plaintiffs and future generations.[13]

The decisions that Speth criticizes may have been made despite compliance with NEPA, but NEPA failed because these understandings of the impacts these decisions about energy policy would have on climate and future generations were not disclosed, and the alternatives that could have avoided the current climate crisis were not discussed or examined as public policy choices.

The challenge for the current CEQ is whether NEPA can be deployed so that the history of U.S. culpability for the climate crisis can be reversed by developing and implementing mitigation strategies adequate to "restore" and "enhance" the human environment before it is too late to preserve human civilization from the impending climate catastrophe.

New Guidance is required to make NEPA relevant to meeting the challenge.

A. The Failed Climate Approach of Current NEPA Guidance.

Current climate Guidance has not rectified a root cause of this failure.

[13] Speth, James Gustave, *They Knew—The US Federal Government's Fifty-year Role in Causing the Climate Crisis* (The MIT Press, 2021).

The Interim Guidance properly highlights the importance of mitigation in the context of addressing the climate impacts of GHG emissions:

> Mitigation plays a particularly important role in how agencies should assess the potential climate change effects of proposed actions and reasonable alternatives. Agencies should consider mitigation measures that will avoid or **reduce** GHG emissions. Given the urgency of the climate crisis, CEQ encourages agencies to mitigate GHG emissions to the greatest extent possible. [Emphasis added.]

88 Fed. Reg. 1206. Unfortunately, this quote provides a rare example of where CEQ mentions the importance of measures that "reduce GHG emissions" as "mitigation." Generally throughout the Interim Guidance CEQ states only that "Agencies should consider mitigation, particularly avoidance and minimization …." *Id*. CEQ encourages agencies to mitigate GHG emissions, but does not define "mitigation" as identifying strategies, measures or policies to reduce system-wide aggregate GHG emissions, rather than simply avoiding additional emissions from new projects.

Merely "avoiding or minimizing" emissions from future agency actions will not achieve the emissions reductions needed to mitigate the impacts of past GHG emissions but will leave the planet on the current path to a climate catastrophe that will be the outcome of warming by 2.5^{o} to 3^{o} C above baseline.

Making grants and approving projects that simply avoid additional tons of CO2 will allow the current rate of CO2 emitted from transport, i.e., 1794 MMT annually, to continue to add to atmospheric loadings of GHGs, and continue to accelerate the warming with its disastrous consequences. It will also continue to perpetuate the excessive health burden borne by communities exposed to current levels of pollution near highways, ports and airports. Your Guidance to "avoid or minimize" emissions as applied project-by-project will not stop or even slow the warming, or stabilize the climate, or divert humanity from the path toward climate catastrophe, or protect communities suffering severe adverse health outcomes.

Your Guidance must direct agencies to follow the science by identifying, analyzing and discussing mitigation measures that reduce aggregate emissions from the transport system to achieve the emission reduction targets identified as necessary to stabilize the climate, and to reduce the health burden imposed on at-risk communities.

The current Guidance allows Agencies to infer that not adding more GHG emissions, or not adding more pollution to communities suffering unacceptable health burdens, is enough to satisfy NEPA. CEQ must be clear: avoiding additional GHG emissions or more pollution is not a permissible interpretation of the Guidance. If it is, then NEPA will not play a role in resolving either the climate crisis, or the community health crisis.

B. Laws and Policies Set Mitigation Targets That Must be Incorporated Into CEQ Climate Guidance.

President Biden acted on the science by declaring that it is the policy of the United States to "… put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050".[14] The science reported by the IPCC is also reflected in the "nationally declared contribution" (NDC) submitted by the U.S. at COP 26 which commits to a 50-52% reduction in CO2 economy-wide by 2030.[15]

The "net-zero" emission policy declared in the President's Executive Order, and the commitment made under the U.N. Framework Convention for Climate Change define the minimum quantitative, cumulative reductions in GHG emissions that must be achieved to mitigate the impacts of climate change. CEQ must align its NEPA Guidance with the President's policy directive in his Executive Order, and the commitment made by the U.S. pursuant to its obligations as a ratifying party to the U.N. Framework Convention treaty,[16] by defining "mitigation" as requiring that federal agencies with authority to control emissions from, and shape the future of the transport sector of the U.S. economy, identify, discuss and explain the authorities, resources and strategies available to them to reduce U.S. GHG emissions from transportation to the levels set within the timelines prescribed by the President and the NDC.

Anything less will fail to implement the statutory purposes of NEPA and make a mockery of the NEPA process by converting it into a meaningless exercise in futility that has no relationship to stopping the otherwise inevitable devastation of an irreversible run-away climate catastrophe.

IV. Statutory and Regulatory Authority Establishing Agency Obligations to Adopt Programs and Measures, and Consider Alternatives and Mitigation to Achieve "Net-zero" CO2 Emissions from Transport, Protect Community Health and Support Patterns of Urban Development Consistent with a Zero Emission Economy.

NEPA requires, but has not been implemented to provide, a decisionmaking framework that focuses agency decisions and resources on achieving the emission reductions to meet the targets set by the science, the President and the U.S. obligation described in the LTS submitted under the U.N. Framework Convention. CEQ Guidance must be augmented to achieve that objective. To protect communities burdened by the adverse health outcomes caused by pollution from transport facilities, and lay the foundation for transportation infrastructure and services that support zero emission communities, CEQ Guidance must also include in the decisionmaking framework how other legacy impacts of past transportation decisions are to be rectified or reversed.

A. Congress Directed Agencies to Restore and Enhance Environmental Quality.

[14] "Tackling the Climate Crisis," E.O. 14008, §201.
[15] LTS,
[16] U.S. Senate, Resolution of Ratification, approved October 7, 1992.

Congress declared that the "purposes" of NEPA include "promot[ing] efforts which will **prevent or eliminate damage to the environment and biosphere** and stimulate the health and welfare of man…." 42 U.S.C. § 4321 [emphasis added].

By enacting NEPA, Congress –

> … recognizing further the critical importance of **restoring and maintaining environmental quality** to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in harmony, and fulfill the social, economic and other requirements of present and future generations of Americans.

42 U.S.C. §4331(a).

To carry out this policy, Congress delegated authority to Federal agencies to act –

> … it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may—
>
> (2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
>
> (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable or unintended consequences; and
>
> (6) enhance the quality of renewable resources ….

42 U.S.C. §4331(b).

Obviously, with respect to climate, NEPA has not "prevent[ed] or eliminate[d] damage to the environment and biosphere," nor have Federal plans, functions, programs and resources been coordinated to achieve a safe or healthy environment for Americans, or to prevent the climate crisis. Guidance must be revised to implement this congressional purpose and policy. Allowing agencies to continue past practices is a prescription for continued failure.

B. Duty to Prevent or Eliminate Damage to the Environment and Biosphere.

Environmental documents prepared to implement NEPA typically have focused on the need to prevent harm, or additional harm, to the human environment, but they rarely identify exiting damage to the environment and consider alternatives or mitigation to eliminate it. With respect to GHG impacts, as explained by the IPCC, *infra,* harm is already happening on a global scale and will continue to become more devastating until energy systems are transformed to achieve net-zero GHG emissions to stabilize the climate. But NEPA has not been deployed to require agencies to identify, evaluate and consider for adoption the programs and measures needed to achieve net-zero emissions.

The authority and duty to identify actions that can achieve net-zero emissions "to prevent or eliminate damage to the environment" from climate change, analyze their costs and feasibility to determine their reasonableness, and discuss requirements and monitoring to ensure their implementation, arises out of the text of the Act describing the purpose of the NEPA process.

CEQ regulations contain the foundation for establishing a decisionmaking framework to carry out that statutory purpose, but it has not been clearly articulated. That foundation was laid in the 1978 regulations that mandate agencies to comply with President Nixon's Executive Order 11514 implementing NEPA three months after he signed the Act into law. That foundation is retained in the 2020 revised rules. See 40 CFR §§ 1500.3(a) and 1507.2(f).

The regulation mandates that "Agencies shall: *** (f) Fulfill the requirements of sections 102(2)(F), 102(2)(G), and 102(2)(I), of NEPA, **Executive Order 11514, Protection and Enhancement of Environmental Quality, section 2,** as amended by Executive Order 11991, Relating to Protection and Enhancement of Environmental Quality, …." 40 CFR § 1507.2 (2020) [emphasis added].

When issuing Executive Order 11514 President Nixon highlighted the dual purposes of NEPA as both "protecting" the environment from actions that are likely to cause future harm and "enhancing the quality of the environment" by taking actions that remedy harm caused by past actions:

> The Federal Government shall provide leadership in protecting and *enhancing the quality of the Nation's environment to sustain and enrich human life*.[17]

Particularly relevant here is the mandate in section 2 that CEQ's rules implement:

> Federal agencies shall: (a) Monitor, evaluate, and control on a continuing basis their agencies' activities so as to protect and *enhance the quality of the environment*. Such activities shall include those directed to *controlling pollution and enhancing the environment* and those designed to accomplish other program objectives which may affect the quality of the environment. Agencies shall develop programs and measures to *protect and enhance environmental quality* and shall assess progress in meeting the specific objectives of such activities.[18]

President Nixon's Executive Order was designed to address the situation we find ourselves in now with climate. When he issued the Order, NEPA was the only environmental statute on the books. The Clean Air Act, Clean Water Act, RCRA, CERCLA, Endangered Species Act, Surface Mining Act were yet to be enacted. NEPA was the only tool available to tackle a massive array of environmental crises. He framed his order to begin the process of developing comprehensive strategies to correct decades of environmental degradation of air, water and other natural systems. The directive to agencies to "develop programs and measures" to deploy their authorities and resources to attack these massive threats is well suited to the challenge we face now with climate.

[17] Executive Order #11514, section 1 [emphasis added].
[18] *Id.,* section 2 [emphasis added].

Commenters ask CEQ to revise, expand and make more specific the obligation of federal transportation decision-makers[19] to "fulfill the requirements of" E.O. 11514. Those requirements include the obligation to "develop programs and measures" that both "protect and enhance environmental quality" from the effects of global warming.

In the GHG and climate context, with existing atmospheric loadings of GHGs already causing serious harm to the human environment, each new ton of CO2 or other GHG adds to existing atmospheric loadings, accelerates climate forcing and makes more severe the devastating impacts of climate warming. To "protect and enhance environmental quality" it is not enough to simply avoid adding more tons of GHGs to current emissions. Emissions in the transport sector must be reduced from 1794 MMT/year to "net-zero" to stop the warming and stabilize the climate. Ultimately, to fulfill the purpose of NEPA to "protect and eliminate damage to the environment," existing atmospheric loadings must also be reduced. But atmospheric loadings can only be reduced after anthropogenic emissions are first reduced to "net-zero."

The "programs and measures" required by E.O. 11514 must show how each agency will use its statutory authorities and resources to achieve GHG reductions from the sub-sector of transport for which it is responsible sufficient to achieve the national "net-zero" policy announced by the President and the 2030 contribution toward that goal contained in the U.S. NDC. Those agency "programs and measures" then serve as the basis for determining what alternatives or mitigation must be considered for each agency action to achieve the aggregate reductions described in the "programs and measures."

C. Restore and Enhance the Quality of the Human Environment.

In its recent decision to revise the NEPA regulations, CEQ recognized the purpose of "restoring … environmental quality."

> NEPA seeks to ''encourage productive and enjoyable harmony'' between humans and the environment, recognizing the ''profound impact'' of human activity and the ''critical importance of restoring and maintaining environmental quality'' to the overall welfare of humankind.

87 Fed. Reg. 23453.

In addition to avoiding adverse environmental impacts that might be created by a proposed action, CEQ has for 45 years interpreted NEPA as also requiring decisionmakers to consider "reasonable alternatives which would avoid or minimize adverse impacts or **enhance** the quality of the human environment." 40 CFR § 1502.1 [emphasis added].

[19] We use the term "Federal transportation decision-makers" to include State or local agencies that prepare NEPA documents pursuant to delegated authority under 42 U.S.C. §4332(2)(D), or the Federal-Aid Highway Act since State officials preparing NEPA documents must comply with NEPA in a manner consistent with CEQ Guidance.

This regulatory obligation governing the scope of EISs implements both the statutory purpose to "promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man…," and the statutory directive that the Federal Government "use all practicable means … to the end that the Nation may – (2) assure for all Americans safe, healthful, [and] productive … surroundings; … and (6) enhance the quality of renewable resources." 42 U.S.C. §§ 4321, 4331(b). The regulatory directive governing EISs also implements the Congressional declaration that the national environmental policy "recognize[s] … the critical importance of **restoring** and maintaining environmental quality to the overall welfare and development of man…" 42 U.S.C. § 4331(a) [emphasis added].

Thus CEQ has traditionally recognized a critical role for eliminating damage and restoring environmental quality, but an EIS for a single proposed action cannot be reasonably expected to consider the broad panoply of options available to transportation agencies to achieve the aggregate reductions in CO2 emission needed to reduce emissions 50% by 2030 to fulfill the U.S. NDC and the President's national policy of achieving a net-zero economy by 2050.

The Nixon E.O. fills that gap by its directive requiring federal agencies to "develop programs and measures" to enhance environmental quality.

D. Rationale for Restoring "Cumulative Impacts" Is Basis for "Programs and Measures" to Enhance Environmental Quality.

NEPA's purpose of "preventing and eliminating damage to the environment" requires that the total cumulative impact of both past and proposed actions be analyzed and considered. The obligation under NEPA to disclose and consider ways to prevent and eliminate damage to the environment was an important factor underlying CEQ's decision to revisit and revise the 2020 regulations to restore the definition of "cumulative effects":

> … consideration of reasonably foreseeable cumulative effects allows agencies and the public to understand the full scope of potential impacts from a proposed action, including how the incremental impacts of a proposed action contribute to cumulative environmental problems such as air pollution, water pollution, climate change, environmental injustice, and biodiversity loss. Science confirms that cumulative environmental harms, including repeated or frequent exposure to toxic air or water pollution, threaten human and environmental health and pose undue burdens on historically marginalized communities.

87 Fed. Reg. 23,467 (April 20, 2022).

The restoration of "cumulative effects" to the scope of impacts to be considered in an EIS makes clear that the overall impact of both past actions and proposed actions must be considered in an EIS. That scope is also relevant to the obligation to develop programs and measures designed to fulfill the statutory obligations to "enhance environmental quality" and "eliminate damage to the environment."

E. Guidance Needed to Implement Statutory Purpose and National Environmental Policy.

These comments focus on the inadequacy of past agency practices to meet the climate challenge, and the need for clear Guidance to assure that transportation agencies act to fulfill the congressional purpose to eliminate environmental damage from the warming climate, and the damage to health that plagues communities affected by the pollution emitted from transportation facilities. Simply avoiding or minimizing more GHG emissions is not enough to satisfy the statutory and regulatory obligations to "prevent or eliminate damage to the environment and biosphere," "restore" and "enhance the quality of the human environment."

We urge CEQ to issue Guidance directing transportation agencies to honor their obligations under NEPA by placing particular emphasis on the agency duties to:

1. consider and explain whether and how agency actions "will or will not achieve the requirements of sections 101 and 102(1) of NEPA as interpreted in the regulations in this subchapter and other environmental laws and policies." Specifically, NEPA declares that the "purposes" of the Act include "promot[ing] efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man…." 42 U.S.C. § 4321 [emphasis added]. The text of the Act makes clear that Congress intended agencies to use their authority to eliminate damage to the environment caused by GHG emissions, and not simply prevent further harm.

2. implement the mandate in E.O. 11514, section 2, to "develop programs and measures to protect and enhance environmental quality" by going beyond merely identifying reasonable alternatives and/or mitigation measures for specific projects to avoid exacerbating existing harm by not adding more emissions, but to also implement the statutory purpose to "eliminate damage to the environment" and "enhance the quality of the human environment" by requiring agencies to adopt programs and measures that describe how they will deploy their authorities and resources to a) reduce emissions to mitigate the atmospheric loadings of GHGs responsible for climate forcing that is currently causing massive losses and damage around the globe, and b) reduce pollution levels that are currently endangering public health.

3. implement the statutory directives to eliminate environmental damage and enhance environmental quality, and the regulatory requirement of 40 CFR § 1502.2(d) by requiring that agencies must discuss how the cumulative impacts of their programs, projects, approvals, grants, investments and emission standards "will or will not achieve the requirements of" at least these two "other environmental laws and policies" that define U.S. climate objectives:

a) the national climate policy established by President Biden in his promise to the American people to prevent a worsening Climate Crisis by "put[ting] the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050," E.O. 14008, section 201; and

b) the "Long-Term Strategy of the United States" for reducing GHG emissions 50-52% by 2030 that was presented to world leaders at COP 26 as the U.S.' "nationally determined contribution" (NDC) pursuant to the U.N. Framework Convention on Climate Change.

We ask CEQ to make clear that all agencies must discuss whether and how their proposed action(s) will implement these policies of the United States because these official declarations of policy goals and objectives –

- reflect the climate science developed under the auspices of the Intergovernmental Panel on Climate Change that explains why humanity must achieve net zero emissions by 2050, with half that reduction by 2030;
- establish specific quantitative GHG reduction targets to guide official actions;
- prescribe 2005 as the baseline for measuring reductions in GHG emissions;
- set timelines by which GHG emissions must be reduced to specific target levels;
- define part of the purpose and need for agency action; and
- make clear for NEPA purposes that agencies must identify and discuss alternatives and/or mitigation that reduce GHG emissions at the scale and within the timeframes needed to implement these policies and international treaty commitments.

To implement these statutory and regulatory provisions, we ask that CEQ provide clear guidance directing agencies to –

1. Meet their obligation under 40 CFR § 1507.2(f) to "fulfill the requirements of E.O. 11514, section 2" to "develop programs and measures" by requiring programmatic environmental impact statements that describe how each agency will deploy its statutory authorities and resources to achieve the aggregate GHG reduction targets set by executive orders and the U.S. NDC within the timeframe for achieving those targets. To ensure that "programs and measures" comply with the statutory purpose to "prevent and eliminate damage to the environment," and the duty established by E.O. 11514 to "protect and enhance" environmental quality, agencies with authority to approve or fund transportation programs and projects must develop programs and measures designed to reduce GHG emissions to meet the NDC targets, i.e., reduce CO2 at least 50% by 2030 and achieve net zero CO2 by 2050.
2. Define "purpose and need" for any policy, program or action that involves the emission of GHGs to include achieving the GHG emission reduction target identified in that agency's programmatic statement of the GHG reductions needed to achieve the U.S. LTS.
3. For the purpose of preparing an EIS to consider alternatives that "minimize or avoid" the adverse impacts of climate warming, define "alternative" as any "investment, service, facility, technology or operating policy, or combination thereof, that meets a need for movement of people or goods while reducing CO2 emitted from the mobile sources operating in, or to and from, a transportation facility 50% from the 2005 baseline by 2030, and to net zero CO2 by 2050."
4. Define "mitigation" as any measure, or combination of measures, that could be implemented at any facility to implement the programs and measures adopted pursuant to E.O. 11514 to reduce GHG emissions to meet the NDC targets established by U.S. commitments under the U.N. Framework Convention.

V. Implementing NEPA through the Nixon Executive Order.

Starting with CEQ Guidance defining "mitigation" for GHG analysis as meeting the U.S. NDC for 2030 under the U.N. Framework Convention, and the net-zero target by 2050 established by E.O. 14008, agencies with responsibility for the development, management and regulation of transportation sources would be directed to comply with the Nixon Executive Order by developing a "program" with "measures" to achieve the emissions reduction targets needed from that sector to achieve the overall 50-52% CO2 reduction contained in the U.S. NDC.

The "National Blueprint for Decarbonization of Transportation" [20] provides a working model of the kind of programmatic statement that could be developed and supplemented with strategies, plans and measures to serve as the framework for analysis of how agency authorities and resources could be deployed to achieve the reductions needed from the transport sector to fulfill the U.S. NDC.

In response to the President's "All of government" approach to meeting the climate challenge, four federal agencies involved in transportation policy, DOT, DOE, EPA and HUD, released their joint Report on January 10, 2023, describing in some detail the impacts of GHG emissions and climate change on the human environment, the CO2 contribution from the transportation sector with an apportionment to various subsectors within the U.S. transportation universe, and the importance of reducing GHG emissions from transportation to achieve both the President's goal of transforming the U.S. into a "net-zero" economy by 2050, and to implement the U.S. LTS.

The "Blueprint" discusses the Long Term Strategy (LTS) by acknowledging that "the LTS established a goal of net-zero GHG emissions by no later than 2050 with an interim, near-term milestone of a 50–52% reduction from 2005 levels in economy-wide net GHGs by 2030."[21] The graphic in the Blueprint[22] depicting the pathways for emission reductions needed to meet the LTS targets shows that virtually all of the reductions expected by 2030 come from electric power generation and transportation. But the Blueprint lacks any reference to the quantity of reductions that will be needed from the transport sector to meet the U.S. NDC by 2030, or discussion of any "programs and measures" describing how these targets might be achieved.

A. Achieving the NDC Targets.

As we discuss, above, in the section summarizing the climate science, achieving the "Long-Term Strategy of the United States" for reducing GHG emissions by 2030 is critical to avoiding the worst devastation from a warming climate. The U.S. LTS, presented to world leaders at COP 26, declared the years ending in 2030 as the "Decisive Decade."

> This is the decisive decade to deliver on a set of new policies [2] to accelerate existing emissions reduction trends—for example, expanding rapidly the deployment of new technologies like electric vehicles and heat pumps, and building the infrastructure for

[20] "The U.S. National Blueprint for Decarbonization of Transportation," DOE, January 10, 2023 ("Blueprint") (https://www.energy.gov/sites/default/files/2023-01/EERE-Decarbonization-Transportation-Report-508.pdf).
[21] Blueprint, 12.
[22] Blueprint, Fig. 1, p. 12.

> key systems like our national power grid. These types of near-term actions will put us on firm footing to meet our 2050 goal (as illustrated by Figure ES-1).[23]

LTS Figure ES-1 depicts an emissions pathway from 5500 MMT in 2021 to about 3300 MMT in 2030. The LTS explains that --

> Putting the United States on a path to net-zero emissions economy-wide no later than 2050 requires taking transformative actions this decade and achieving near-term milestones in line with this goal. This is why the United States set an economy-wide target of reducing its net GHG emissions by 50-52% below 2005 levels in 2030 (Figure 2).[24]

Achieving these targets "requires electrifying most vehicles to run on ever-cleaner electricity and shifting to low-carbon or carbon-free biofuels and hydrogen in applications like long-distance shipping and aviation."[25]

The LTS estimates a potentially large range in the reductions likely from transport before 2030, from a low of only 2 exajoules (from 24 to 22), to a high of 8.5 (to 15.5).[26] To meet the NDC, Figure 1 presents a graphic showing the modeled reductions upon which the LTS is based. Rough calculation suggests that reduced fossil fuel use in the U.S. transportation sector must achieve the higher end of the range by 2030 because the expected reductions from buildings are minimal,[27] and GHG emissions from industry would likely remain flat or possibly increase by 2030.[28] Assuming that the President's goal of decarbonizing electric power generation 80% by 2030 will be achieved, the remaining reduction in national CO2 needed to meet the NDC must come primarily from transportation. At the higher end of the range, CO2 emissions from transportation would be reduced from 1794 MMT in EPA's 2021 GHG Inventory[29] to about 1200 MMT in 2030.

The LTS explains that most of the reduction from transportation must come from transitioning to zero emission technologies by replacing internal combustion engines (ICE) with zero emission vehicles (ZEV), and displacing fossil fuels with bio-carbon fuels.

On-road vehicles, according to the Blueprint, account for the largest number of ICE vehicles, the largest volume of fuels burned, and 70% of CO2 from transport. ZEV technology is commercially available for most of these vehicles now, whereas zero emission technologies are still in the development stages for off-road construction equipment, aviation, and ocean-going vessels. If, for example, half of on-road ICE vehicles are replaced by 2030, national CO2 would be reduced by roughly 9.25% (on-road vehicles contribute 23% of US CO2 (33% x .7), cutting that share in half would reduce CO2 by 11.5% (23 x .5), but only 80% of the electricity used to power the

---

[23] LTS, 4.
[24] LTS, 13.
[25] LTS, 15.
[26] LTS, Fig. 8, p. 30.
[27] LTS, 32. Fig. 9 shows approximately 1 exajoule reduction in fossil fuel use by 2030.
[28] LTS, Fig. 10, p. 34.
[29] "Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021," Fig. ES-6, 10 (U.S. EPA, 2023) [available at: https://www.epa.gov/system/files/documents/2023-02/US-GHG-Inventory-2023-Chapter-Executive-Summary.pdf].

vehicles would be carbon-free (11.5% x .8)}. The remaining 20-22% reduction needed to meet the NDC would need to come from reducing vehicle miles travelled (VMT), other transport sources, buildings, and industry.

B. GHG Reductions from Current Policies.

Independent analysts have performed modeling analyses to estimate the reductions in CO2 likely to be achieved by 2030 from current policies. These analyses are illustrative of the kinds of analysis that could be undertaken by agencies as the basis for developing programs pursuant to the Nixon Executive Order.

Most comprehensive of the analyses commenters have reviewed is "Closing the Emissions Gap Between the IRA and the 2030 U.S. NDC: Policies to Meet the Moment" by Robbie Orvis' team at Energy Innovations.[30] This work includes an analysis of the reductions needed from major sectors of the economy including transportation, likely impact of IRA tax credits on vehicle sales by 2030, and an estimation of the shortfall that will need to be filled by other policy interventions to achieve the reductions needed to meet the 2030 NDC. "Closing the Emissions Gap" finds that sales of ZEVs would need to reach 67% of market share by 2030 to meet the NDC.

We do not endorse or adopt their conclusion. Rather we submit that report to demonstrate another methodology in addition to the U.S. DOE models described in the LTS that is available to agencies to estimate the progress likely to be achieved by current policies, and to flag the need for additional policies and actions to make the progress needed to achieve the U.S. NDC. The tools may not be precise, but they are available to perform the task of assessing whether current policies are adequate to the task, and if not, help quantify the additional reductions needed from each sector to achieve the magnitude of climate "mitigation" promised by the U.S. LTS.

C. The Decarbonization Blueprint.

The multi-agency *Blueprint* was released to lay out a path for decarbonizing transportation, but it does not show how the U.S. will achieve the reductions needed from transportation to implement its LTS. The *Blueprint* acknowledges that transportation emits one-third of U.S. CO2 making it the largest source ahead of electric power generation that accounts for 25% of U.S. emissions. Transport emissions grew 22% from 1990 to 2019 and continue to increase annually post-COVID. While aggregate U.S. CO2 emissions have dropped during the last decade, transportation emissions continue to grow. The U.S. 2030 commitments in the LTS cannot be achieved without reversing this trend to achieve major reductions from transportation.

The *Blueprint*, on pages 57-58, identifies seven transportation subsectors for which GHG reduction strategies will be developed, each sector's current contribution to total GHG emissions from transport, and a brief summary of the strategy for the sector:

[30] https://energyinnovation.org/wp-content/uploads/2022/12/Closing-The-Emissions-Gap-Between-IRA-And-NDC-Policies-To-Meet-The-Moment.pdf [downloaded 4/2/2023].

1) cars, SUVs and light trucks (49%) – Strategy: 50% new vehicle sales market share to be zero emission vehicles (ZEVs) in 2030;

2) medium- and heavy-duty trucks and buses (21%) – Strategy: 30% market share ZEVs by 2030;

3) off-road vehicles and mobile equipment (10%) – Strategy: set targets, but no committed goal;

4) rail (2%) – no reduction targets by 2030;

5) marine vessels (3%) – 5% use of zero emission fuels by 2030;

6) aviation (11%) – 20% reduction by 2030 by efficiency improvements, zero emission fuels; and

7) pipelines, military, lubricants (4%) – no reduction.

Of these sectors, 2030 emission reduction targets are set only for aviation (20%), and marine vessels (5%). Emission reduction goals are not identified for any other subsectors, but instead of emissions 2030 targets are set for new electric vehicle sales: 1) 50% of new cars and light duty trucks, and 2) 30% of medium /heavy duty trucks and buses.

Together, the *Blueprint* attributes 70% of U.S. transport CO2 emissions to (light duty (LD) and heavy duty (HD))on-road vehicles. Acknowledging the importance of replacing on-road fossil fueled internal combustion (IC) vehicles with ZEVs, the *Blueprint*, Fig. 8, cites a modeling analysis showing that if 100% of all new vehicles are required to be ZEVs by 2035, in that year an estimated 65% of vehicles on the road, and 15% of vehicles by 2050, would still be powered with fossil fuels. That modeling analysis confirms that far fewer than 50% of on-road will be replaced by 2030. But the *Blueprint* does not show what the 50% ZEV sales target for LD vehicles, and 30% sales target for M/HD vehicles, would actually achieve toward replacing on-road IC vehicles by 2030, or the sales target needed to achieve the LTS reductions.

1. Analysis of 2030 Sales Targets on 2030 Vehicle Fleet.

To estimate the impact of the *Blueprint* sales target on total fleet composition, Commenters performed a simple calculation using a few basic assumptions about the national vehicle fleet to estimate the changes in the vehicle fleet by 2030.

The number of IC vehicles replaced by ZEVs in the national fleet is the single most important factor for estimating changes in emissions from the on-road sector. However, this is not an emissions modeling analysis that takes into account other factors relevant to estimating expected CO2 emissions in 2030, such as any improved fuel efficiency of new ICE on-road vehicles added to the fleet before 2030, growth in vehicle miles traveled, and changes in the vehicle mix such as the continuing trend toward replacement of sedans with pick-ups which are less fuel efficient.

(a) Fleet Data and Assumptions.

Currently, 275 million vehicles are registered for operation on U.S. highways, of which little more than 1 million are ZEVs. We make these assumptions:

- Annual new vehicle sales through 2030 will continue at the post-2019 rate of 15 million units, totaling 120 million new vehicles during model years 2023-2030;

- ZEV vehicle sales will increase annually from 2023 to 2030 at the rate of ZEV sales in 2022 (5.5%), which will achieve 50% market share by 2030;
- the national vehicle fleet will grow during the decade from 2021 to 2030 at the same 10% rate as from 2011 to 2020 which will increase the national fleet from 275 million vehicles to 302 million in 2030.

Using these assumptions, the national vehicle fleet will add 83 million new ICE vehicles during the decade and 37 million ZEVs. The total ICE fleet will continue to grow through 2028. Annual on-road CO2 emissions will continue to grow over the first 6 years of the 8-yr period because the number of ICE vehicles will increase during 2023-2026, and then start to drop, but not drop below 274 million through 2028. Net reductions in ICE vehicles below 274 million units are achieved only beginning in 2029. By the end of 2030, 263 million ICE vehicles will be on the roads, a 4% drop in total ICEs.

(b) Blueprint On-road Vehicle Electrification Strategy Outcomes.

By 2030 the *Blueprint*'s 50% sales target would achieve a 4% reduction in the number of vehicles using fossil fuels in 2030 compared to 2020 if all new vehicles were LDVs. But these assumptions include the total on-road vehicle fleet. If medium- and heavy-duty vehicles achieve only 30% sales by 2030, total ZEV sales will be reduced. CO2 reduction from LD ZEVs will be offset by a net increase in the total number of medium/heavy duty vehicles using fossil fuels in 2030. Because M/HD vehicles use 2 to 8 times more fuel per mile driven than a sedan, the net effect will be no significant reduction in CO2 emitted from transportation by 2030.

The *Blueprint* does not describe any strategies that will achieve the economy-wide reduction in emissions from transport needed to achieve the 50-52% reduction promised by the US at COP 26. The NEPA Guidance we request would provide a framework in which the agencies would be required to identify the "programs and measures" that will achieve those reductions.

2. Blueprint Identifies Shift in Travel Demand to Reduce GHG Emissions.

The continued growth in CO2 emissions from the transport sector is driven, in part, by an increase in miles traveled by all vehicles, most of which will continue to be fossil fueled vehicles well beyond 2030. In addition to switching ICE vehicles to ZE technologies, the *Blueprint* also identifies measures designed to reduce growth in VMT, including "prioritization of zero-emission transportation projects in discretionary grant programs; transit-oriented development policies to support reliable, frequent, and affordable public transportation services; transportation-demand management programs (e.g., rideshare and vanpool programs, employer-based trip reduction programs); investments in walking and biking infrastructure; transportation planning …."[31] We agree that these policies offer promise as part of a comprehensive strategy for reducing GHG emissions, but the *Blueprint* fails to explore how these policies might be applied, or the CO2 reductions that might be achieved.

D. Blueprint Could Serve as a Program Under E.O. 11514.

The *Blueprint*, as released in January, does not satisfy NEPA as a programmatic EIS because it fails to recognize the U.S. LTS as the benchmark for measuring "mitigation" in the climate

[31] Blueprint, 24.

context, and fails to discuss how the agencies could achieve the CO2 reductions needed to meet the mitigation target identified in the LTS. But it could fill those gaps and serve as the framework for describing the "program and measures" required by the Nixon E.O. to serve as the programmatic basis for evaluating whether and how individual agency actions, such as the investment of transportation funding, would contribute to implementing the reductions defined by the LTS.

If CEQ accepts our request that agencies use the LTS as the benchmark for determining the reductions needed to "mitigate" GHG impacts, then periodic updates will perform important functions under NEPA by (i) informing the White House, Congress and the public of progress being made toward achieving the mitigation needed to stay within the 1.5^{o} C rise needed to avoid the worst consequences of climate change, (ii) identifying sources that need to be reduced further or faster, and (iii) providing an open public forum for discussion of the additional actions, including alternatives available, to achieve the mitigation. As CEQ has noted, engaging interested parties and the public in these decisions is an important objective of the NEPA process:

> Federal agencies have an obligation to consider "important ideas and information on how Federal actions can occur in a manner that reduces potential harms and enhances ecological, social, and economic well-being. See, e.g., 42 U.S.C. 4331, 4332(2)(A).

87 Fed. Reg. 23454 . The *Blueprint* was not developed through a public process. As a programmatic EIS it would be.

VI. Strategies Available to Reduce GHG Emissions from Transport.

A "program" for transportation envisioned by the Nixon E.O. would begin with defining the CO2 reductions needed to "mitigate" GHG emissions by achieving the targets in the LTS, and then evaluating the "measures" capable of achieving those targets, including such actions as regulatory strategies available to EPA to require the production and sale of ZEVs, the actions available to US DOT, DOE, States and local governments to promote the deployment, use and operation of ZEVs, and the land use policies, transit and shared ride service enhancements, parking policies and incentives for walking and biking that could be implemented to reduce passenger vehicle use and reverse VMT growth.

For most transportation sources, zero emissions can be cost-effectively achieved by 1) switching to non-fossil fuels such as electrification of on-road vehicles with batteries or fuel cells, 2) shifting travel to more energy efficient modes such as from aircraft to high-speed rail, and 3) reducing dependence on motorized vehicles to move people and goods such as locating housing within walking or biking proximity to regional transit stations, commercial outlets, medical care, recreation and entertainment venues.

A. NEPA Review of Transportation Projects.

1. Purpose and Need.

CEQ should ensure NEPA reviews for transportation projects would achieve progress towards GHG reduction targets and include this as a core element of project "purpose and need." As discussed above, a business as usual transportation and development approach, even with the most optimistic assumptions for vehicle electrification, fails to achieve the deep emissions reductions required to meet our national climate commitments without accompanying, transformative changes to reduce the number of miles driven in cars.[32] This finding is underscored by a recent report from the Georgetown Climate Center, which found that "minimizing further highway expansion [is] the most important lever to avoid putting upward pressure on transportation emissions."[33]

Transportation agencies often erroneously include in the baseline "no build" scenario the additional growth and traffic that would be induced by the project. In other words, the NEPA analysis assumes auto-dependent development would occur without the project, and therefore the project is justified to meet this demand for vehicle travel, when in reality, the project creates the demand.[34] As a result of this omission, the true environmental impact of a project is severely underestimated, including increased greenhouse gas emissions resulting from the extra, avoidable VMT growth.[35]

CEQ must provide more detailed guidance on how to properly assess climate change effects associated with the transportation sector, including those caused by destruction of natural resources, induced growth, and induced traffic. Most importantly, the guidance fails to address the serious common error of including the highway in the baseline "no build" scenario, and it

---

[32] Institute for Transportation Development & Policy, "The Compact City Scenario – Electrified" (Dec. 2021), https://www.itdp.org/publication/the-compact-city-scenario-electrified/ ("This study models four possible scenarios for change in urban passenger transport. It includes business as usual; extensive vehicle electrification; promotion of compact cities built around walking, cycling, and public transit; and the combination of vehicle electrification plus compact cities and mode shift. We find that neither electrification nor compact cities alone are capable of reducing emissions to a level consistent with limiting global warming to less than 2°C. Only with both vehicle electrification and compact cities together can we limit future global warming to less than 2°C and stand any chance of the climate returning to a warming of less than 1.5°C by the end of the century").

[33] Georgetown Climate Center, "Issue Brief: States Are in the Driver's Seat on Transportation Carbon Pollution" (Mar. 24, 2023), https://www.georgetownclimate.org/blog/states-in-the-driver-eys-seat.html.

[34] This "induced demand" phenomenon is discussed at greater length in section 2 below.

[35] Three recent projects in North Carolina—the Monroe Bypass, Garden Parkway, and Complete 540 highway projects—highlight this systemic problem of incorporating a proposed highway into the underlying "no build" scenario. Each project was a major highway expansion that would carry traffic from a major urban area into a more rural part of the state. Each project would facilitate the growth of sprawling suburban development and massively increase the amount of miles driven. Yet because of flawed models that assumed growth from the highway into the baseline assumption, each NEPA analysis concluded that the project would have almost no impact on climate, air quality or increased traffic numbers. *See N.C. Wildlife Fed'n v. N.C. Dep't of Transp.*, 677 F.3d 596 (4th Cir. 2012); *Catawba Riverkeeper Found. V. N.C. Dep't of Transp.*, No. 5:15-CV-29-D, 2015 WL 1179646, at *7 (E.D.N.C. Mar. 13, 2015); *Sound Rivers v. NCDOT* 4:18-CV-00097-D (E.D.N.C.).

should be revised to direct agencies to evaluate the induced growth and traffic of a project for every alternative and not include this growth or traffic in baseline assumptions.

The NEPA process is ideal for helping decision-makers and the public understand the interconnected relationship between transportation investments, land use decisions, and their climate and environmental justice consequences, especially in communities and habitats that are already extremely vulnerable. We believe agencies that work in urban and built environments would benefit from more guidance on how to quantify and contextualize potential climate change impacts in their NEPA documents.

CEQ should state clearly that agencies considering transportation investments must include an assessment of how the actions will contribute to the CO2 reductions identified by the agency in its programmatic EIS as necessary to achieve the LTS. That assessment would include an analysis of whether the project would result in induced VMT growth and increased CO2 emissions. The analysis should quantify and disclose the potential CO2 emissions and climate change impacts from these indirect effects, as required by NEPA regulations,[36] using accurate models. Agencies should employ models that include induced demand to predict emissions impacts of transportation projects. Agencies need to use models that have been proven to be reasonably accurate to assess the GHG emissions impacts of both short- and long-term transportation plans so that they can make informed decisions in line with emissions reduction goals.[37]

If a project analysis finds that VMT growth will contribute to increased CO2 emissions, then the agency would be required to consider alternatives designed to reduce emissions from the project, such as limiting lanes to ZEV-only lanes, barring the operation of diesel engines in the corridor, prohibiting single-occupant vehicles during peak travel periods or enhancing transit services in the area to reduce demand for personal vehicle use.

NEPA plays an essential role in the review of transportation projects by prompting project planners to appropriately assess the impacts of proposals and give due consideration to alternatives that would encourage more compact development, increase system efficiency, reduce vehicle miles traveled, and invest in more multimodal transportation options—all necessary steps on the path to net-zero emissions by 2050.

---

[36] 40 CFR 1508.1(g)(2).

[37] Sophisticated modeling and tools are also available to practitioners and incorporated into the traffic modeling guidance of state departments of transportation around the country. *See, e.g.,* Colorado DOT, "Traffic Analysis and Forecasting Guidelines" (Jan 2023), https://www.codot.gov/safety/traffic-safety/assets/traffic_analysis_forecasting_guidelines/traffic_analysis_forecasting_guidelines; Oregon Dep't of Transportation, Analysis Procedures Manual, Version 2, Chapter 10: Analyzing Alternatives (2022), https://www.oregon.gov/odot/Planning/Documents/APMv2.pdf.

2. Induced Demand

Many highway projects, especially those extending into less populated exurban areas, are designed to increase or speed up travel by motor vehicles while often excluding alternatives to motor vehicles. This singular focus on driving triggers increased auto-oriented growth and development in previously undeveloped area, induces added motor vehicle traffic, and further locks in motor vehicle dependence.[38] Widening or building new roads may reduce congestion initially, but research shows these projects ultimately induce added traffic and congestion returns.[39]

All too often, however, agencies include in the baseline "no-build" scenario the additional growth and traffic that would be induced by the project. In other words, the NEPA analysis assumes the development would occur without the project, and therefore the project is justified to meet this demand, when, it is the project itself that creates much of the demand. As a result of this mistake, the true environmental impact of a project is badly underestimated, including GHG emissions resulting from the extra growth and traffic. As discussed below, there are many other ways that induced demand may not be properly accounted for in NEPA analyses of highway expansion projects.

CEQ regulations explicitly recognize induced growth among the potential indirect effects of a project:

> *Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. 40 CFR § 1508.8(b).*

CEQ must provide clear guidance to ensure agencies assess all proposed actions in consideration of their climate effects, in particular the role that highway projects play to induce car-dependent sprawl and traffic by making it harder to fulfil economic and social aspirations with shorter, slower, lower-carbon travel. CEQ must do more to ensure agencies rely on the latest analysis tools and data, rather than outdated and inconsistent modeling approaches to forecast travel demand and to evaluate transportation-related investment impacts.

The Federal Highway Administration offers *Guidance on Application of Travel and Land Use Forecasting in NEPA*, [40] dating from 2010. This discusses induced demand and acknowledges it as "*one of the most controversial issues with regard to forecasting as part of the NEPA process*," noting that,

---

[38] National Association of City Transportation Officials, "Design Year" (adapted from the *Urban Street Design Guide*), available at https://nacto.org/publication/urban-street-design-guide/ (accessed April 6, 2023).
[39] Milam, R. T., Birnbaum, M., Ganson, C., Handy, S., & Walters, J. (2017). Closing the Induced Vehicle Travel Gap Between Research and Practice. Transportation Research Record, 2653(1), 10–16. https://doi.org/10.3141/2653-02
[40] Federal Highway Administration, Guidance on Application of Travel and Land Use Forecasting in NEPA, March 2010, https://www.environment.fhwa.dot.gov/nepa/Travel_LandUse/travel_landUse_rpt.aspx

"*it is important for transportation analyses to consider the significance of induced demand. Induced demand is the volume of traffic that is drawn to a new or expanded road by providing additional capacity. This induced demand comes from a number of sources, including trips diverted from other routes, discretionary trips that might not have been made without the service improvement, and improved access to employment and other activity location choices*."

FHWA's Guidance notes that the models used in the U.S. transportation planning and NEPA analysis process are mostly poor in their effectiveness at reflecting the various components of induced demand, as shown in the table below, drawn from the Guidance.

Table 6: Components of Induced Demand

Time frame of impact	Induced Demand Components	Effects on Forecasting Analysis	Effectiveness of Model
Short–run Impacts	Change in number of trips	The net addition of trips will affect traffic, noise, and emissions impacts	Poor – Trip generation models are typically based on demographic factors such as household size, income and auto ownership, and are insensitive to changes in travel time or accessibility.
	Change in length of trips	Change in trip length will affect duration of use of facility and emissions	Fair – Trip distribution models use an aggregate measure of impedance based largely on travel times. Feedback of travel impedances from assignment to distribution enables distribution models to be sensitive to congestion effects.
	Change in mode of travel	Change in mode to or from auto will affect noise and emissions	Good – Disaggregate mode choice models estimate mode choice probabilities based on relative attractiveness of alternative modes with respect to travel times, costs, and other factors.
	Change in route	Changes in route will affect traffic volumes on facility and emissions	Good – Equilibrium traffic assignment models reallocate trips to alternative routes based on travel impedances and volume-delay functions.
	Change in time of travel	Changes in time of travel will affect levels of congestion	Poor – Most travel models partition daily trips into fixed time periods with no option for adjustment between periods based on traffic volumes.
Long–run Impacts	Change in development patterns	Net addition of trip-generating land uses will increase traffic volumes, may increase trip lengths	Poor – Most travel models use population and employment forecasts developed outside the model and have little or no feedback between the travel model and land use forecasts.
	Change in behavior (e.g., vehicle ownership)	Changes in behavior have long run-impacts on number of trips, length of trips, mode of travel and hence affect traffic volumes	Poor – Most travel models use static assumptions about future residential locations, vehicle ownership, and mode preferences.

Short-term induced demand results from changes in the number of trips people take, where people travel to, what mode they take, and what route they take. Table 6 shows that typical practice models tend to account reasonably well for some of these short-term induced demand effects but do not generally account for changes in the number of discretionary trips taken and the time of travel. Longer-term induced demand can arise from changes in household location or vehicle ownership, and these longer-term impacts are notably harder to measure and relate to a specific transportation project with a high degree of confidence. Figure 4 illustrates short and long-run sources of induced demand.[51]

FHWA's Guidance notes that

Typically, the long-term land development effects are more effectively analyzed at the system, metropolitan, or regional level. At this scale of analysis, systematic interrelationships between the transportation system and land development characteristics and dynamics (including other relevant policies and conditions) can be meaningfully evaluated. The results of these planning-level analyses may be incorporated in the NEPA process if appropriate.

The Guidance notes also that --

Regional emissions analyses are conducted to produce estimates of emissions over a large area, typically the air quality non-attainment or maintenance areas (such analyses are not routinely conducted in attainment areas). This type of analysis is usually conducted to assess regional

emissions to support a conformity determination for an MPO long-range transportation plan to demonstrate conformity or for a project in an isolated rural non-attainment or maintenance area. Travel demand forecasting models are generally used to supply inputs for the emissions estimation process, although some areas may use other appropriate forecasting methodologies. Typically, forecasting models or methodologies are used to produce future VMT and speed estimates for the regional network. These estimates are used to represent travel activity in the study area. Emission rate models (such as MOBILE6.2 or MOVES) are used to create emission rates based on travel activity, vehicle fleet mix, temperature, and other variables. Emissions are estimated by multiplying the appropriate VMT estimate to the corresponding emission rate. From a NEPA study forecasting perspective, the key considerations include consistency of assumptions and data and evolving analysis methods.

However, the current transportation planning and NEPA process, being generally reliant on Static Traffic Assignment methods without correction or proper auditing, is ineffective at ensuring consideration of induced land use and travel impacts of transportation projects or consideration of alternatives that might better minimize and reduce GHG emissions. Significant improvements in data science for traffic and transportation analysis are not well recognized in FHWA modeling guidance. There are few effective guardrails to limit use of poorly validated models that disregard induced demand effects and other important factors essential to realistically estimating travel times, speeds, and system response to capacity changes. FHWA recognizes that --

Few analysis methods are as integral to NEPA and other project development studies as travel and land use forecasting. Forecasts provide important information to project managers and decision-makers, and are used throughout the project development and NEPA processes, providing foundations for purpose and need. They are important in evaluating the performance of alternatives, the estimation of environmental impacts, induced land development effects, and resulting indirect and/or cumulative effects.

Even though it is so integral to the NEPA process, forecasting is not a heavily legislated or regulated area and is mainly driven by the standards of professional practice. This results in a large variation in practice and experience. Forecasting methods are often the source of disagreements among agencies, and forecasting is often the subject of litigation.

CEQ needs to press FHWA to update its modeling guidance to comport with the recent significant developments in transportation analysis methods and related data science. Without such action, NEPA analyses and the regional and state transportation planning process will continue to produce grossly erroneous analyses of the GHG impacts of transportation investments, locking in long-term GHG growth.

We know a lot about induced traffic. A comprehensive literature review carried out for the California Air Resources Board in 2014 noted,

Because stop-and-go traffic reduces fuel efficiency and increases greenhouse gas (GHG) emissions, strategies to reduce traffic congestion are sometimes proposed as effective ways to also reduce GHG emissions. Although transportation system management (TSM) strategies are one approach to alleviating traffic congestion, traffic congestion has traditionally been addressed through the expansion of roadway vehicle capacity, defined as the maximum possible

number of vehicles passing a point on the roadway per hour. Capacity expansion can take the form of the construction of entirely new roadways, the addition of lanes to existing roadways, or the upgrade of existing highways to controlled-access freeways.

One concern with this strategy is that the additional capacity may lead to additional vehicle travel. The basic economic principles of supply and demand explain this phenomenon: adding capacity decreases travel time, in effect lowering the "price" of driving; when prices go down, the quantity of driving goes up (Noland and Lem, 2002). An increase in vehicle miles traveled (VMT) attributable to increases in capacity is called "induced travel." Any induced travel that occurs reduces the effectiveness of capacity expansion as a strategy for alleviating traffic congestion and offsets any reductions in GHG emissions that would result from reduced congestion. If the percentage increase in VMT matches the percentage increase in capacity, congestion (a function of the ratio of VMT to capacity) is not alleviated at all…

Increased highway capacity can lead to increased VMT in the short run in several ways: if people shift from other modes to driving, if drivers make longer trips (by choosing longer routes and/or more distant destinations), or if drivers make more frequent trips (Noland and Lem, 2002; Gorham, 2009; Litman, 2010). Longer-term effects may also occur if households and businesses move to more distant locations or if development patterns become more dispersed in response to the capacity increase. Capacity expansion can lead to increases in commercial traffic as well as passenger travel (Duranton and Turner, 2011)...

The best estimate for the long- run effect of highway capacity on VMT is an elasticity close to 1.0, implying that in congested metropolitan areas, adding new capacity to the existing system of limited- access highways is unlikely to reduce congestion or associated GHG in the long-run. [41]

A summary of the studies reviewed by Handy and Boarnet is in the table below.

[41] Handy, Susan and Boarnet, Marlin G., *Policy Brief on the Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions,* California Air Resources Board, Sept 30, 2014.

Table 1. Impact of Capacity Expansion on VMT

Study	Study location	Study year(s)	Results	
			Change in VMT/ change in lane miles	*Time period*
Duranton and Turner, 2011	U.S.	1983 - 2003	1.03	10 years
Cervero, 2003	California	1980 - 1994	0.10	Short term
			0.39	Long term
Cervero and Hansen, 2002	California	1976 - 1997	0.59	Short term (1 year)
			0.79	Intermediate term (5 years)
Noland, 2001	U.S.	1984 - 1996	0.30 to 0.60	Short term
			0.70 to 1.00	Long term
Noland and Cowart, 2000	U.S.	1982 - 1996	0.28	Short term
			0.90	Long term
Hansen and Huang, 1997	California	1973 - 1990	0.20	Short term
			0.60 to 0.70	Long term – counties
			0.90	Long term – metro areas

The CARB review of the effects of highway capacity expansion on VMT and GHGs concludes that,

> *Given the induced travel effect, capacity expansion has limited potential as a strategy for reducing congestion. The additional vehicle travel induced by capacity expansion increases GHG emissions as well as other environmental effects, including increased air, water, and noise pollution. On the other hand, capacity expansion potentially generates economic and social benefits, at least in the short run, even if the new capacity is completely filled by induced travel. The additional benefits derive from the fact that the expanded highway is carrying more people, each of whom benefits from his or her travel. However, most studies of the impact of capacity expansion on development in a metropolitan region find no net increase in employment or other economic activity, though highway investments do influence where within a region development occurs (Handy, 2005; Funderberg et al., 2010).*
>
> *In addition, the construction process itself generates both positive and negative effects. Most obviously, highway construction projects create jobs that can boost the local economy. On the other hand, highway construction projects often have substantial negative effects on the communities through which they are sited, particularly if construction necessitates the removal of homes or businesses. Historically, low-income and/or minority communities were and continue to be disproportionately affected by such projects.*
>
> *In contrast, reductions in road capacity tend to produce positive social and environmental effects, and they can also generate economic benefits. For example, many cities in Europe have adopted the strategy of closing streets in the central business district to vehicle traffic as an approach to economic revitalization (Hajdu, 1988; Rodriguez, 2011). Road diet projects are*

becoming increasingly popular in California and elsewhere in the U.S. as a way to support modes other than driving and enhance the local environment, though their economic impacts have not yet been systematically documented.[42]

A growing number of state DOTs have acknowledged that to meaningfully reduce transportation sector emission, they must pursue strategies that will reduce vehicle miles of travel.[43] This means more deliberate, connected land use planning and a greater investment in multimodal transportation options. Some of these states are moving towards improving the transportation modeling tools they use to evaluate long-range plans, even if they may not employ these methods appropriately in NEPA analysis. CEQ should press agencies like FHWA, to move quickly to support state and MPO adoption of more effective analysis tools that consider induced demand and accessibility as they do GHG analysis and planning.

Current Transportation Planning and NEPA Practice.

As the Chart by Frontier Group[44] below shows, U.S. highway traffic forecasts are recurrently badly over-estimated. Following current US DOT planning and NEPA guidance, most State DOTs and highway project sponsors use poorly validated computer models to over-estimate future traffic growth to justify expanding highways, asserting that without added lanes or a new highway, other lanes or roads would suffer intolerable levels of congestion caused by traffic growth to 20 or 30 percent over capacity.

Many of these same agencies then argue that expanding the highways will reduce congestion that would occur if the road was not expanded and hence reduce GHG emissions, ignoring induced demand.

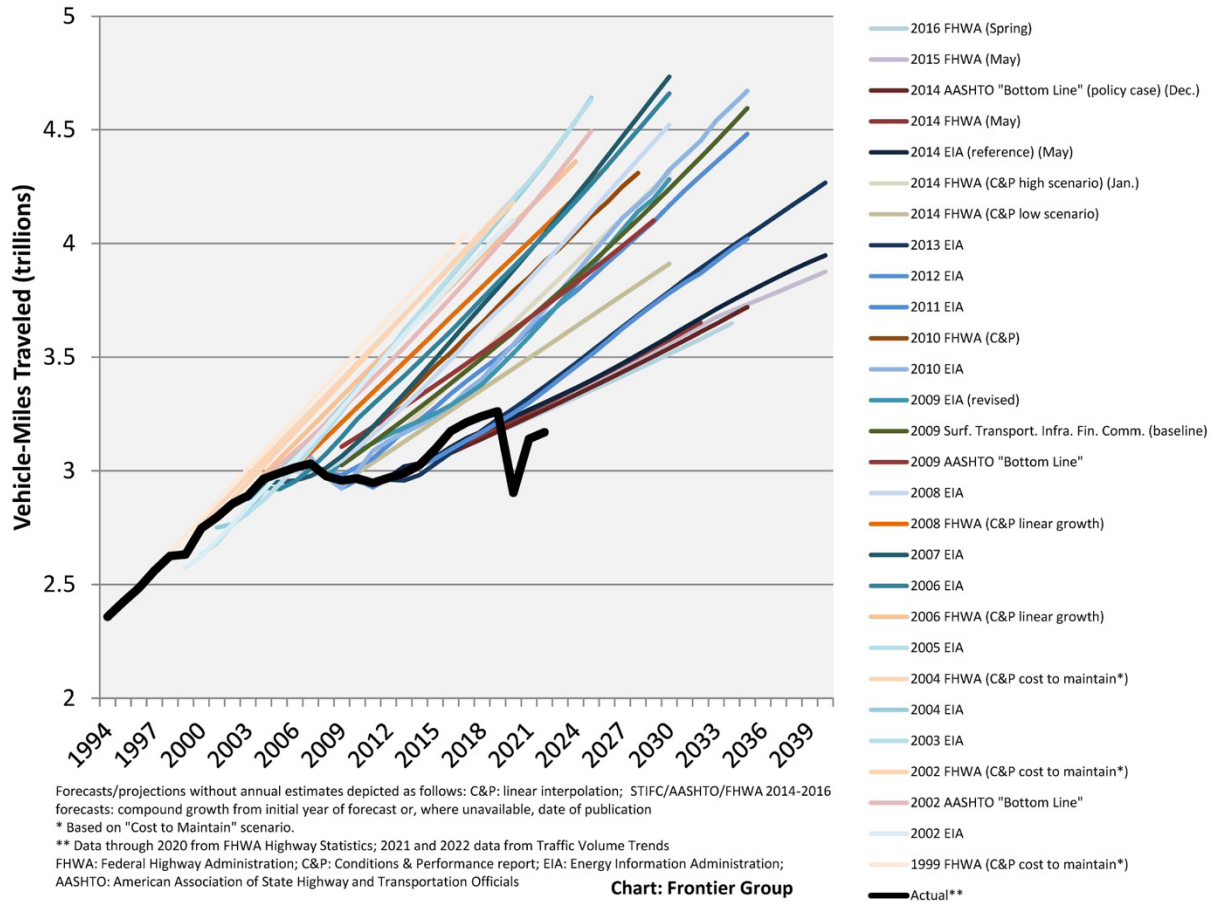
FHWA's Guidance on the topic of induced demand is so weak as to be meaningless, enabling project sponsors to ignore this by following what FHWA accepts as standard practice, even while acknowledging that doing so is controversial and creates litigation risk.

---

[42] Handy, Susan and Boarnet, Marlin G., *Policy Brief on the Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions,* California Air Resources Board, Sept 30, 2014.

[43] Georgetown Climate Center, *Issue Brief: Transportation Carbon Pollution"* cites carbon plans in New York, Michigan, Pennsylvania, and VMT reduction targets in California, Minnesota, and Washington.

[44] Dutziuk, Tony, https://twitter.com/FrontierTony/status/1631074171554783232



Similarly, models used by Metropolitan Planning Organizations and State DOTs for regional and state transportation and air quality planning are generally not designed to represent induced demand. Most are not able to reflect how major transportation investments change accessibility of households to jobs by transit or accessibility of households to food, shopping, medical care, schools, or recreation by walking or cycling. As a result, in most regions, these models are inadequate to be used as the foundation for GHG evaluation of the emissions impacts of projects subject to NEPA. Stronger CEQ guidance is needed to ensure FHWA and other agencies ameliorate this with effective national modeling standards for NEPA.

The I-495 and I-270 Express/Managed Lanes FEISs illustrate the failure of current FHWA transportation planning and NEPA process guidance, which encourages the use of deeply flawed modeling approaches that time after time tell false stories about impacts. For example, the Maryland I-495 and I-270 Managed Lanes Study FEIS tells a simplistic traffic story. It claims that if the project is not constructed, corridor traffic volumes will grow significantly, and delays will grow exponentially. It claims the project will reduce congestion on the general-purpose lanes relative to traffic conditions today. It claims that the project will alleviate congestion on other roads.

This simple story is wrong. The same promises were made based on similar modeling in the Virginia I-495 Express Lanes FEIS a few years earlier. The construction of the I-495 Express Lanes proved that the promises were false, as the Express Toll Lanes created the worst bottleneck on the Capital Beltway today. After the Express Lanes opened, Pre-Covid travel times in the Virginia I-495 general-purpose lanes increased instead of decreasing as had been forecast. The FEIS wrongly claimed that the lanes would yield only benefits for travel on other roads, when in fact, many roads experienced increased peak period traffic.

A significant part of why things did not turn out as forecast is due to reliance on flawed modeling. Flaws in the Metropolitan Washington Council of Governments (MWCOG) model include that it: 1) does not constrain traffic flow to capacity, 2) does not properly feedback congested travel times to non-work destination choice, 3) assumes no increased traffic from road expansion, 4) fails to accurately forecast bottlenecks, 5) cannot calculate net congestion benefits, and 6) cannot accurately model peak period conditions.

The NEPA traffic analysis then takes these flawed "demand" estimates and inputs them into a capacity constrained VISSIM model that is overwhelmed and produces erroneous output. This "garbage" output from the VISSIM model is the basis for most of the FEIS traffic metrics and are invalid. The claims made in the Maryland FEIS are the same as those made in the Virginia FEIS. The underlying modeling approach is the same.

Based on empirical data from Virginia and Maryland, understanding of model flaws, and data analysis, the reasonably foreseeable impacts of constructing managed lanes on I-495 and I-270 follow:

1) Expanding I-495 and I-270 will shift traffic from the shoulder hours into the peak hours and create and/or exacerbate bottlenecks. The flawed models employed in the FEIS analyses are incapable of forecasting this type of problem.
2) An improvement in general-purpose lane speed is unlikely because constructing the managed lanes will shift traffic from the shoulder hours into the peak hours, and the general-purpose lanes will be just as congested during the peak hours as they would have been otherwise. The foundational premise of this project is that extreme congestion in the general-purpose lanes is needed to justify the high tolls that will be required to fund the project.
3) Constructing the I-495 and I-270 managed lanes is likely to make arterial congestion worse. No trip begins or ends on a limited access highway, and traffic does not magically switch between limited access highways and arterials as is presented in the FEIS. Any shifts between these roadway classes causes traffic increases on some arterials and traffic decreases on others. As managed lanes concentrate traffic in the peak hour, arterial roads at I-495 and I-270 interchanges will be severely impacted, and these impacts are likely to outweigh the congestion benefits of traffic diversion from other arterials. The EIS models are incapable of calculating these tradeoffs.
4) If the managed lanes are constructed, it is likely that there will be significant traffic growth (induced travel) and induced land use impacts.

Current NEPA guidance for highway project appraisal also appears to be providing an inadequate framework for the evaluation of the Rose Quarter I-5 Widening Supplemental Environmental Assessment from 2022. This relied on an outdated 40-year old methodology to adjust existing traffic data, disregarding multiple additional studies which show much lower no-build traffic estimates, while offering more current analysis.

Even though Oregon DOT and its partners have undertaken multiple additional studies which show very different results, ODOT has ignored the results of those studies, and in the EA and SEA continues to rely on a Traffic Operations and Safety ("TOAS") report generated in 2015. ODOT has failed to base its EA and SEA environmental and traffic analysis on more recent model estimates including:

- Its own 2018 analysis of value pricing, which produced different and much lower no-build estimates of traffic for I-5,
- Metro's 2018 Kate regional travel demand model which is based on more recent data and a more precise methodology than ODOT's TOAS report, and
- ODOT's own "tolling sensitivity analysis memo" (included in the Traffic Analysis Supplemental Technical Report) which indicates that traffic in the No-build scenario would be much lower than indicated in the EA or SEA analyses.

ODOT and FHWA have failed to incorporate the effects of road pricing (including the Regional Mobility Pricing Program, tolling for the IBR project and tolling on I-205) in its analysis of future traffic levels in the "No-Build" future. This overstates traffic, congestion and pollution in the No-build and under-estimates the added traffic due to the "Build" scenario. ODOT incorrectly claimed that pricing is not "reasonably foreseeable" on the basis that a specific pricing project is not included in the 2018 Regional Transportation Plan (RTP). But the evidence that pricing is integral to this project is overwhelming including House Bill 2017 (2017) which started a process to implement pricing which is ongoing and statements at Transportation Commission meetings in March and April of 2022 that the Rose Quarter project could not be completed without toll revenue.

Past Failure Shows Why CEQ Needs to Act Now to Press for NEPA Modeling Reforms. CEQ must take strong action to press for reform of transportation modeling standards and requirements for NEPA, considering the past failure by US DOT set and enforce effective standards for transportation and air quality planning. One of the major causes of the failure of ozone State Implementation Plans (SIPs) to produce attainment during the 1980s was the systematic failure of the transportation models to account for the very significant increase in motor vehicle emissions that resulted from induced travel demand caused by new highway construction. The need for Congress in 1990 to enact an entire new program for ozone control in America's urban areas can be attributed, in significant part, to the deficiencies in the transportation models that failed to account for traffic growth trends of the preceding two decades. The failure to account for induced traffic and its emissions in the 1980s caused virtually all ozone SIPs to fail.

Indeed, almost all metropolitan areas failed to attain even when they implemented pre-1990 SIPs EPA thought were adequate for attainment.[45]

Yet typical computer traffic models used by MPOs in 1990 were simple highway engineering models ill-suited for public policy or environmental analysis. Many of these tools were estimated on old data, insensitive to induced traffic and land use changes caused by changes in transportation system capacity and user costs, and unable to represent walking, bicycling, public transportation, or travel choices other than driving. The most serious consequence of large errors in these transportation and emission models was the failure to reduce motor vehicle emissions enough to meet the National Ambient Air Quality Standards (NAAQS), due to underestimation of traffic growth, or overestimation of the emission reductions likely from policies adopted in SIPs or under federal emission reduction programs, such as advanced inspection and maintenance of motor vehicles.

To address this problem, following passage of the 1990 Clean Air Act (CAA) amendments, the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) provided a 1.5 percent set-aside from several federal transportation funding categories to support MPO planning, data collection, modeling, and related activities required to implement the conformity and transportation planning process. Congress also authorized the use of Congestion Mitigation Air Quality (CMAQ) funds and other federal transportation funds to support such activities.

In 1993, U.S. DOT and EPA established a Federal Travel Model Improvement Program (TMIP) to help foster needed changes to MPO traffic models and EPA invested in further improvements to its MOBILE emissions factor models. TMIP provided useful training to MPOs and documented and disseminated current best practices in transportation and land use modeling. There were two major federal programs that funded Dynamic Traffic Assignment (DTA) pursued independently by FHWA and without and coordination. The planners oversaw TRANSIMS and traffic researchers oversaw development of DynaMIT and DynaSmart.

TMIP invested the bulk of its resources for over a decade in a politically motivated and doomed effort which received tens of millions of dollars from FHWA. TRANSIMS, based at Los Alamos National Lab, developed TRANSIMS, a supercomputer-based traffic simulation model that was promised as a public-sector designed open-source tool that would be available for use by other public agencies. TRANSIMS software was based on a deeply flawed architecture that could never properly represent traffic. Efforts to attract commercial interest in the TRANSIMS code were doomed and went nowhere, because the code was useless, attracting no interest even as

[45] Michael Replogle, U.S. Transportation-Air Quality Planning: Evolution of Recent Federal Law and Its Implementation**,** Presented to the CEMDA/ITDP International Seminar: Toward the Reform of Transportation and Air Quality Planning, Mexico City, 28 June 2004, https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=6ef991249419a32ec57313c5643a48b8fd68c51e

,

FHWA made it open source. Consultants bidding on FHWA research projects could win bids by including TRANSIMS as part of their approach, but these subsidized efforts failed.

The other DTA software development effort fueled by federal funding arose from traffic engineers at Turner Fairbanks research center of FHWA. They had not been involved in TRANSIMS. In 1995, FHWA organized a competition to select a research group to develop a real time DTA simulator, focused on competition between academic researchers, with prior success in developing software solutions not being a consideration in the process. As a National Lab, Oak Ridge (ORNL) could be given contract work by FHWA without competition and ORNL was selected to run the DTA efforts. Many graduate students were funded to work on these projects. However, neither TRANSIMS nor DynaSmart, MITSIM, or DYNUS-T have resuled in applied use of DTA by government agencies, consultants, or other stakeholders.

In the meantime, MPOs in non-attainment areas increased their spending to update their travel models and data collection throughout the 1990s in response to EPA conformity regulations that established minimum modeling standards, but few MPOs flexed STP or NHS funds to support an expanded data collection and planning effort to improve their travel and emissions modeling capabilities to deal with peak-period modeling, Dynamic Traffic Assignment, accessibility analysis, or other measures to better account for induced traffic.

EPA's conformity regulations were streamlined in 1995, reducing the specificity of modeling requirements. FHWA in the mid-1990s issued weak, limited guidance on transportation modeling practices that failed to promote best practices and encouraged MPOs to be satisfied with adopting "standard practice" models instead. Interagency consultation established as part of transportation and air quality planning and every three-year MPO certification reviews has been the principal source of oversight of the adequacy and integrity of the transportation modeling process. While many of these measures have been of some value and have encouraged some improvement of MPO transportation modeling for conformity and SIP analysis, they fell far short in effecting timely MPO adoption of best practices. Widespread transportation model failure to reflect reality persists, as documented throughout these comments.

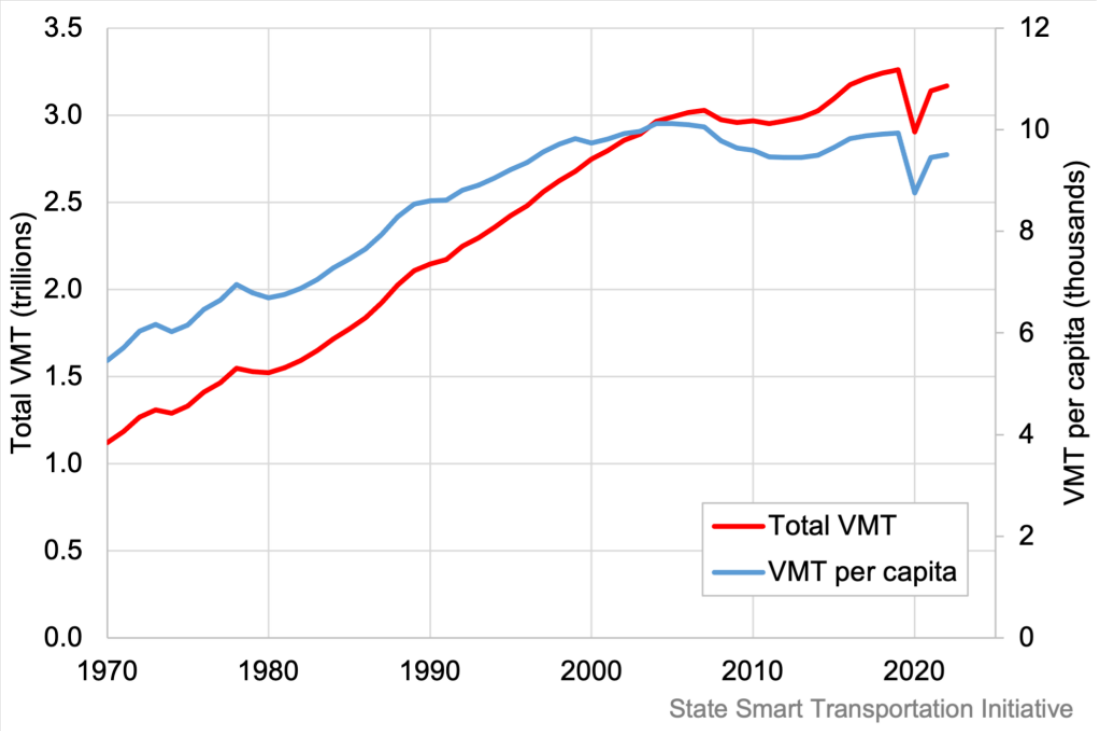
Greater innovation has come out of the private sector, with groups like Caliper launching TransModeler in 2005 and PTV developing VISSIM in similar time frames. In 2006, a $200 million Strategic Highway Research Program (SHRP2) research effort aimed to produce a practical DTA tool. However, FHWA staff insisted on use of open-source software, on production of a mesoscopic DTA that would run on a conventional highway network, and that each DTA project would need to integrate with an Activity Based Model (ABM). A few MPOs tried to work with TRANSIMS and DYNUS-T, but these were not effective. Another round of SHRP2 solicitations was made in 2013, but FHWA again would accept only bids using open-source software. None of these projects, again using DYNUS-T, were successful or have resulted in applications that support project evaluations or planning decisions.

In the end, government participation in software development in this area has been an impediment, not a stimulus, to private development of useful tools. The lesson is that FHWA and other agencies should set performance requirements for tools and provide oversight to raise standards for application of analysis techniques, rather than trying to develop and push software developed by the government. CEQ and DOT should take note.

Travel models developed to comply with existing FHWA modeling guidance are out-of-touch with emerging mobility trends and changes in how people use surface transportation facilities. CEQ should press FHWA and other agencies to make significant changes in their model guidance to address these issues in the context of GHG analysis for NEPA.

As a recent analysis by Chris McCahill of the Smart State Transportation Initiative pointed out,

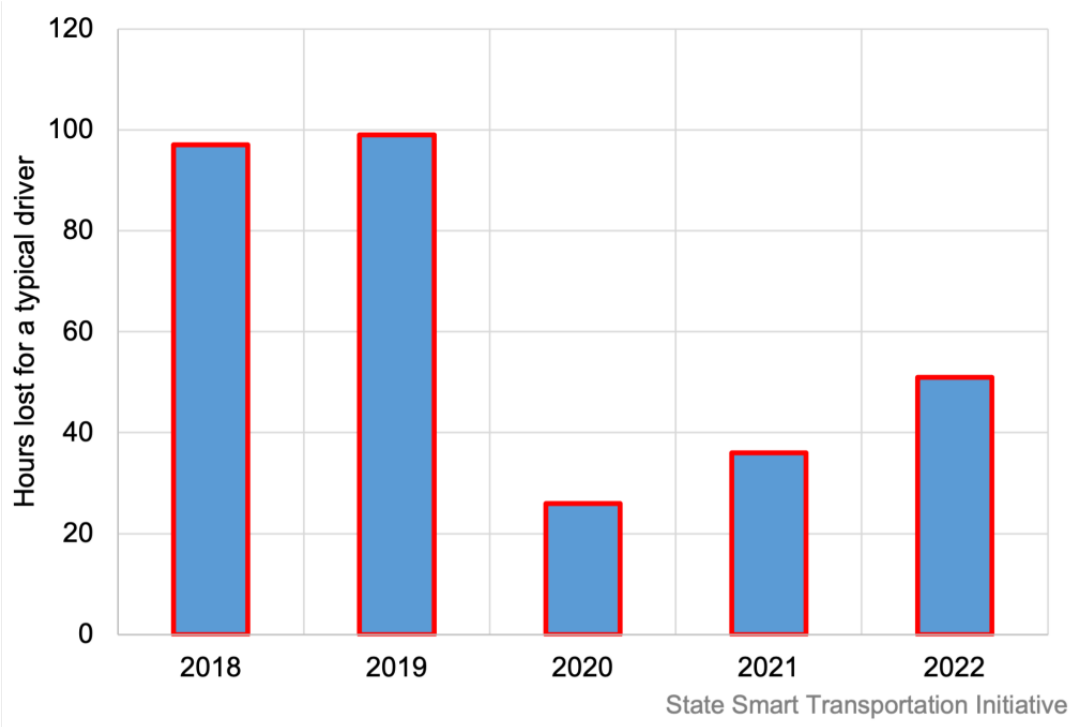
> *Vehicle miles traveled (VMT) in the U.S. totaled 3.17 trillion last year, according to preliminary estimates from FHWA. That is a one percent increase from 2021 and a nine percent increase from 2020—the height of the pandemic—but still nearly three percent lower than VMT in 2019. After accounting for population growth, the average American drove four percent less in 2022 than in 2019 and six percent less than the highest point in 2004.*



VMT trends in the U.S. Source: FHWA.

> *Meanwhile, the total hours lost to congestion for a typical driver increased 42 percent from 2021 to 2022, according to INRIX, indicating that the slight increase in VMT likely represents a considerable shift in travel patterns—from decentralized off-peak travel to*

more peak period travel on major routes (i.e., typical 9-to-5 commuting). This is still nearly 50 percent lower than it was before the pandemic, however, which suggests we might be seeing the start of a "new normal" in daily traffic patterns, as people have more flexibility in working remotely.



Total hours lost per year for a typical driver in the U.S. Compiled from INRIX's Global Traffic Scorecards.

These emerging trends have important implications for transportation agencies as they plan for future capacity and operations along major routes.

As Tony Dutzik at Frontier Group has long noted [see Figure above], *traffic volumes continue to fall short of national forecasts from FHWA, AASHTO, and the U.S. EIA, despite those estimates being revised downward year after year. Not only does this give agencies a reason to reassess planned capacity improvements, but also to consider measures like shifting transit service toward off-peak periods and weekends. And while slower VMT growth is essential for meeting ambitious climate goals, the continued rise*

in pedestrian deaths suggests that higher levels of traffic congestion might have had an unintended safety benefit before the pandemic.[46]

Tools Available to Consider Induced Demand

Increasingly across the U.S., transportation stakeholders are employing the many tools available to project sponsors, State DOTs, MPOs, and federal agencies to consider the induced demand impacts of proposed major highway projects, plans, and programs.

RMI's SHIFT (State Highway Induced Frequency of Travel) Calculator cites more of the research literature and shows how induced travel can be calculated for project and programs based on the body of existing empirical evidence.

> *RMI has developed and calibrated the induced travel calculator to evaluate the net impacts of class 1 (interstate) road widenings in US Metropolitan Statistical Areas (MSAs) and of class 2 or 3 roadways in urbanized counties (i.e., counties in MSAs)—including their effect on state-wide vehicle miles traveled (VMT) and their emissions impacts. The calculator builds on analysis and methodology first published by Jamey Volker and Susan Handy at the University of California-Davis to* ***calculate the induced travel impacts of lane mile additions in California metros and counties. It was also recently extended by Joe Cortright to Portland, Oregon.***
>
> *The calculator will enable users to estimate long-run induced VMT (i.e., steady state in 5 to 10 years) from capacity expansions of large roadways in MSAs or urbanized counties based on existing lane mileage and VMT data. Drawing from the body of literature estimating the relationship between VMT and lane mileage increases on these roads, it applies a ratio of 1.0—meaning a 1% increase in lane mileage yields a 1% increase in VMT—for expansions on interstate highways and a ratio of 0.75 for expansions on other freeways, expressways, and principal arterial roads. This is consistent with literature discussed in greater detail below—the calculator generates an estimate for induced VMT at the appropriate order of magnitude for a given area based on this body of empirical research. Because the calculator uses factors that are drawn from studies that consider the impacts of road widenings over hundreds of observations and many years to calculate net impacts, the calculator is best used to understand order-of-magnitude impacts, rather than precise, project-specific outcomes. As described below, we take steps to underscore the limited precision of the calculations by reporting in intervals, as well as by clearly contextualizing the underlying research and scope of analysis in this document.*

---

[46] McCahill, Chris, "Americans are still driving less than before the pandemic," March 6, 2023. https://ssti.us/2023/03/06/americans-are-still-driving-less-than-before-the-pandemic/?eType=EmailBlastContent&eId=b64bb3fa-4740-4ff6-9a8c-1c1105d1f07f

> *The calculator is not intended as a substitute for more granular traffic modeling or simulations, but rather as a tool that can effectively translate well-established induced travel demand literature to an informed understanding of the impacts of road expansions.*[47]

California has done work illustrating how states or metro areas might begin to undertake a programmatic evaluation framework that considers induced traffic. As the Director of the California Department of Transportation, Toks Omishakin, notes,

> *Reducing total driving, or Vehicle Miles Traveled, is the focus of the TAF, TAC and the associated changes to transportation impact analysis under CEQA for projects on the State Highway System. In plain terms, the more we drive our cars, the more damage we cause to the environment and our health—and the less time we spend with our families and communities. A Vehicle Miles Traveled-based approach supports transportation projects that create more travel choices, such as new rail lines, improved bus service, trails, paths, and safer streets for walking and bicycling. As these modes of transportation grow, we can reduce the dependence and burden on our already congested highway system…*
>
> *The purpose of this* Transportation Analysis Framework *is to assist Caltrans district staff and others responsible for assessing likely transportation impacts as part of environmental review of proposed projects on the SHS by providing guidance on the preferred approach for analyzing the VMT attributable to proposed projects (induced travel) in various project settings.* [48]

Induced demand is contextual and interacts with by many factors. Because of these complexities, studies of induced travel have turned to a variety of models to help identify the key factors affecting VMT. The CALTRANS Transportation Analysis Framework identifies in guidance how these effects must now be considered in California environmental evaluations of projects that would increase capacity of major highways:

> *Methods used to study induced travel include models specifically investigating the effects of transportation investments on induced travel, travel demand models designed for multiple analysis and forecasting tasks and sometimes used to estimate the share of travel that is induced, and case studies of travel growth and its causes in particular corridors and regions. The guidance provided in Section 4 directs CEQA practitioners to select and apply a single method or a combination of methods based on project characteristics and context and the applicability of the available tools. A general discussion of the two primary tools available for estimating induced travel in connection with infrastructure investments is provided below. Elasticity- based methods including the National Center for Sustainable Transportation (NCST) induced travel calculator are discussed in Section 3.2 and use of travel demand models is discussed in Section 3.3.*

---

[47] RMI, *SHIFT (State Highway Induced Frequency of Travel) Calculator*, https://rmi.org/wp-content/uploads/2021/10/rmi_shift_calculator_methodology.pdf

[48] California Department of Transportation *Transportation Analysis Framework First Edition: Evaluating Transportation Impacts of State Highway System Projects*, September 2020. https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/sb-743/2020-09-10-1st-edition-taf-fnl-a11y.pdf

The Framework recommends that the NCST Induced Travel Calculator, which is like the RMI Calculator, be used unless the regional transportation model has been benchmarked and is consistent with the Calculator. The NCST at the University of California at Davis has developed an online tool, the NCST induced travel calculator, that uses elasticities to estimate induced travel associated with the addition of new general purpose or high occupancy vehicle (HOV) lanes on the State Highway System.

As CALTRANS has noted, regional Travel Demand Models (TDMs) vary widely in their ability to estimate induced travel associated with highway investments.

> *Some models can estimate induced travel reasonably well and some others cannot. For example, some model systems do not have the capability to account for changes in origin-destination patterns, increases in trip rates, and changes in location and land use resulting from transportation investments. In addition, models are not always applied in a way that fully uses their capabilities.*
>
> *Many improvements have been made to travel models over the last two decades, but there remains considerable variation in the level of detail and the sophistication of the models in use in California and elsewhere. Depending on the specifics of model specification, estimation, and application, travel models may provide a reasonable estimate of induced travel, or they may under- or over-estimate induced travel. As Volker et al. (2020) reported, induced travel estimates set forth in some published environmental documents are well below those estimated by empirical studies, and underestimation is a concern. The likely reasons for such differences include:*
>
> - *Land use changes and associated travel are a significant component of induced travel, but some transportation planning models treat land use as exogenous and some further assume it is fixed (i.e., land use is not altered as a result of transportation system changes.)*
> - *Some travel models, either in specification or in application, do not include a mechanism to feedback network travel times and travel costs to land use mode choice, destination choice, and trip frequency modeling elements (Marshall 2018)*
> - *Price and income are sometimes treated in limited ways; and therefore, important impacts on travel choice are not well represented in the models*
> - *Reliability is often not represented by the travel model even though it can be important to the traveler: a small reduction in travel time can be accompanied by a large reduction in travel standard deviation, providing a meaningful improvement in reliability.*
> - *Network levels of detail may be insufficient to reflect traffic conditions, available route and mode choices.*
> - *Boundary cutoffs may mean that a portion of travel outside the model's boundaries is not well represented in model analyses, though it may be impacted by system changes.*

- *Models are not always run to traffic assignment equilibrium where network congestion is minimized.*
- *Models are often calibrated to observed data such that the alternative- specific constants take a large (outsized) importance in the choice models, rendering them less sensitive to time and cost.*
- *Finally, models may not have been thoroughly validated over a period of time in which travel times and costs have changed (such that it should be possible to see if the models would have predicted such changes.) (Panel Report, 2020)*

A review of the capabilities of available travel demand models and their applications is therefore in order before relying solely on their outputs as a basis for evaluating induced travel impacts of projects on the State Highway System.[49]

The 2020 CALTRANS Transportation Analysis Framework has provided a checklist to provide specific guidance for evaluating whether a travel demand model is appropriate for use in estimating induced travel. CEQ should request that FHWA prepare a similar checklist to be used to determine the adequacy of MPO and other regional models for NEPA evaluation of highway projects and other federal transportation planning requirements, mandating the use of an elasticity based induced demand calculator as a reference check, as in California.

Some states, like Colorado, are using increasingly sophisticated tools, such as an activity-based statewide traffic model, and recognize the need for special attention to evaluating over-saturated highway networks. Colorado DOT's "Traffic Analysis Tool Selection Matrix," itself adapted from a Virginia DOT Traffic Operations and Safety Analysis Manual, identifies a wide array of modeling tools. It recommends use of microsimulation and dynamic traffic modeling tools, such as TRANSMODELER and VISSIM, for multimodal project evaluation and to evaluate traffic response to a variety of design and operation changes, especially in congested areas.[50]

But Colorado DOT accepts use of daily trip models, which fail to represent induced demand and are prone to overestimating traffic volume and congestion levels in both base and future years. CDOT's 2023 *Traffic Analysis Guidelines* pay little attention to ensuring that models are sensitive to induced demand, merely noting that conventional trip-based models are insensitive to it and that activity-based models have somewhat greater capacity to take it into account.

Norm Marshall has observed the fundamental and widespread problem that travel model travel time metrics are inaccurate because they rely on Static Traffic Assignment (STA), a 40-year-old

[49] California Department of Transportation *Transportation Analysis Framework First Edition: Evaluating Transportation Impacts of State Highway System Projects*, September 2020. https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/sb-743/2020-09-10-1st-edition-taf-fnl-a11y.pdf

[50] Colorado DOT, Traffic Analysis and Forecasting Guidelines, January 2023. https://www.codot.gov/safety/traffic-safety/assets/traffic_analysis_forecasting_guidelines/traffic_analysis_forecasting_guidelines

approach that routinely forecasts unfeasible future traffic flows that exceed capacity. He notes that –

> *Basing metrics on these impossible volumes produces invalid results. The common practice of exporting link volumes or subarea trip tables to microsimulation fails to address the STA problem because the unrealistically high STA traffic forecasts are forced onto a capacity-constrained network. Inaccurate travel time modeling helps to explain why so many roadway projects fail to deliver promised travel time savings. Replacing STA with Dynamic Traffic Assignment (DTA) produces more realistic metrics. A case study from the Portland Maine region is presented where STA and DTA are compared with the same inputs. The DTA model fits base year count traffic count much better. The DTA model produces more much lower and more realistic estimates of congestion relief from freeway widening...The Portland case study demonstrates that regional DTA is both practical and useful. It is recommended that more DTA research is focused on regional DTA. It is also recommended that regional DTA be implemented wherever practical and used to replace STA in both regional planning and project studies.*[51]

A growing number of metro regions are exploring innovative approaches to demonstrate affordable, practical, and replicable regional traffic modeling approaches. The new generation Triangle Regional Model (TRMG2), developed for the Research Triangle region of North Carolina, is a hybrid travel model (rather than a full Activity Based Model) with enhanced model sensitivity to multiple induced demand elements. Implemented within the powerful and widely accessible TRANSCAD software produced by Caliper Corporation, TRM uses machine learning methods for disaggregate person-level trip production modeling and nested logit models for destination choice. TRMG2 tool has been applied to evaluate road widening, highway parking and tolling, addition of a bus route, improvements to pedestrian infrastructure, and changes in household income. In a test of the effect of adding a bus route it is reported to show appropriate sensitivity to auto ownership, trip productions, non-motorized trip making, mode choice, non-home-based trip making, and both transit and highway assignments. [52]

Caliper Corporation's TransModeler software and PTV's VISSIM software are both effective commercial options for MPOs and states seeking Dynamic Traffic Assignment capabilities. They both have been demonstrated in small, mid-size, and large metropolitan areas. Case study applications of high fidelity DTA using TransModeler are documented for Phoenix, AZ, Jacksonville, FL, Whatcom County, WA, and Lake County, CA, in a paper that concludes that,

[51] Norman L. Marshall, Forecasting the impossible: The status quo of estimating traffic flows with static traffic assignment and the future of dynamic traffic assignment, *Research in Transportation Business & Management*, Volume 29, 2018, Pages 85-92, https://doi.org/10.1016/j.rtbm.2018.06.002 .

[52] Vincent L. Bernardin, Jr., Kyle Ward, Leta Huntsinger, Ramachandran Balakrishna, Srinivasan Sundaram, "An Advanced State-of-the-Practice Hybrid Travel Demand Model for the North Carolina Research Triangle Region," accessed April 7, 2023 at https://www.caliper.com/pdfs/trbam-23_trm.pdf

"*Microscopic DTA is both feasible and practical, running in reasonable time on desktop hardware that is affordable and readily available*." [53]

For example, the Phoenix DTA model covered 525 square miles, with 17,333 nodes and 23, 358 links and 2,164 intersections. In Phoenix, the calibration was to both volumes and speeds; adding the latter as a calibration factor "significantly enhances the quality of the model and the modeler's confidence in its outputs," because they are far more realistic. Inrix data was used for speed measurement.

The Lake County DTA network covered 450 square miles and was represented by 3,300 nodes and 4,200 links, representing 720 miles of roadway, focusing on the 3 hour AM and PM peaks.The Lake County model was built to study the route choices of heavy vehicles and their impacts on the neighborhoods adjacent to the main freeways in the region. GPS travel time data were available to validate the model's predictions.

By estimating AM and PM peak travel times of day through DTA, calibrated to real world data, these models become capable of more refined sensitivity to induced demand. But this contrasts with all-too-common daily traffic models still in use across U.S. metro areas, such as the model for the Metropolitan Washington Council of Governments (MWCOG), which rely on black box adjustment factors to force bad model outputs to fit to observed traffic volume data, while ignoring often impossible travel time and speed model estimates. The infidelity of such models to reality has long been documented but FHWA has taken no effective action to ensure these problems are addressed.

As long ago as the late 1980s and again in 2002, the MWCOG model was observed to poorly simulate peak period traffic and was found to have poor sensitivity to observed differences in travel behavior in new areas built to be car-dependent vs. built to be pedestrian-friendly. Member governments of the MPO, such as Montgomery County, developed their own models which were found to better simulate peak period travel conditions, smart growth, and the effects of changes in pedestrian friendliness. [54,55] Three decades later these problems in the MPO model remain unaddressed.

---

[53] Qi Yang, Ramachandran Balakrishna, Daniel Morgan, Howard Slavin, "Large-Scale, high fidelity dynamic traffic assignment: framework and real-world case studies," Transportation Research Procedia, 25(c) (2017) 1290-1299. https://doi.org/10.1016/j.trpro.2017.05.152

[54] Replogle, Michael, "Computer Transportation Models for Land Use Regulation and Master Planning in Montgomery County, Maryland," *Transportation Research Record 1262,* Washington, DC. 1990. https://onlinepubs.trb.org/Onlinepubs/trr/1990/1262/1262-011.pdf

[55] Testimony of Michael Replogle to Senate Environment and Public Works Committee, July 30, 2002, Attachment 7: *Critique of Transportation Planning Board Travel Demand and Air Emissions Models*, Norm Marshall & Brian Grady, https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=6ef991249419a32ec57313c5643a48b8fd68c51e

CEQ should direct that FHWA and FTA update modeling guidance, so state and regional travel model practice and guidance might better learn from best practices and move rapidly away from obsolete methods.

FHWA should be encouraged to move past its failed attempt twenty years ago to create TRANSIMS, a federally supported Activity Based Model incorporating Dynamic Traffic Assignment. FHWA should now encourage and promote adoption of the best tools available including non-open-source software. The private sector has innovated to create powerful tools largely without federal support. US DOT has been a laggard in setting high enough standards and expectations to spur the market for application of these tools by states and MPOs.

In developing new modeling guidance, CEQ should also direct US DOT to support the dissemination, adoption, and application of tools enabling regional and state modeling to measure multi-modal transportation system connectivity performance measures. Various tools have been developed and documented but these have not received adequate support from FHWA and FTA.

A report by the Smart State Transportation Institute documents how to measure key indicators of accessibility of households to opportunities by transit, walking, and cycling, as well as implementation initiatives in Virginia, Hawaii, Boston, Salt Lake City, an at the national level, by US EPA. [56] Without building such measurements into regional transportation plan analysis and the evaluation of impacts for NEPA, it is impossible to adequately appraise how proposed major investments will affect GHGs, emissions, and the harms and benefits experienced by frontline disadvantaged communities and others. Measuring accessibility has many practical advantages as well, including:

- *It measures what travelers care about—how readily they can meet their needs. This accounts for vehicle speed but also the distance of trips and other barriers, so it can be superior to conventional speed-focused measures in guiding decisions.*
- *It provides a common measure for assessing various transportation modes and modal investments. Accessibility measures how many opportunities travelers can reach, or how long it takes travelers to reach opportunities, and this metric—unlike various level of service measures—is consistent across modes.*
- *It provides a common platform for considering land use and transportation questions. Transportation networks and land uses can both be modified, e.g., during scenario planning, and evaluated for accessibility.*
- *It can be scaled up or down to encompass site and neighborhood access or regional and statewide access. The impacts of small transportation projects are invisible in many conventional travel analyses, so accessibility can help fill that gap and remove a bias toward supporting larger projects over smaller ones.*
- *It can be calibrated to represent a variety of network or land use conditions. For example, auto accessibility can be pegged to observed travel speeds at different times of day, and walking*

[56] Eric Sundquist, Chris McCahill, and Michael Brenneis, has published Measuring Accessibility: A Guide for Transportation and Land Use Practitioners, Smart State Transportation Institute. 2021. https://ssti.us/wp-content/uploads/sites/1303/2020/12/Measuring-Accessibility-Final.pdf

accessibility can reflect pedestrian comfort or perceived hazards using concepts like "level of traffic stress." Fine-grained land use data allow the drawing of important distinctions, e.g., between convenience stores and grocery stores when considering food deserts.

- *It makes sense to non-technical stakeholders. Where models often rely on numerous assumptions and complex calculations, accessibility simply describes travel times.*
- *It can be calculated with relatively little training. Several applications let users manipulate transportation and land use data and run analyses using standard GIS or similar platforms.*
- *Accessibility calculations are relatively quick compared to, say, running scenarios in travel demand models. As such, they can be used to assess multiple scenarios in a short time. (Caveat: To precisely assess the impact of a transportation project, we will need predicted travel speed changes, which may come from travel demand or traffic-simulation models.)*
- *It can be used to predict outcomes. While accessibility analysis does not replace predictive models that distribute trips throughout networks, by comparing modal accessibilities we can estimate outcomes such as vehicle miles traveled, mode share, personal transportation costs, and emissions.*
- *It can provide a critical link between policy goals and decision-making in practice. Accessibility can be assessed at key decision points—approval of a development project, design of a highway, transit service improvements, or development of an area or corridor plan—to determine how those decisions advance policy goals*.[57]

3. Alternatives to Reduce VMT.

State and federal initiatives aimed at improving fuel economy and increasing the sales of electric vehicles are not enough to reach full decarbonization of surface transportation and must be complemented by many other emission-reducing strategies.[58] NEPA must play an essential role in addressing the climate crisis by encouraging project sponsors to prioritize projects and policies that meet the Long Term Strategy GHG goals by encouraging more timely electrification, more compact development, greater system efficiency, fewer vehicle miles of travel, and expanded multimodal transportation options -- all necessary to meeting national greenhouse gas reduction targets.

Several states have begun concerted efforts towards these ends. As federal agencies advance their Decarbonization Blueprint, they should advance and support best practices. By further updating its GHG NEPA guidance, CEQ can advance opportunities to secure new and more effective federal agency guidance for state and local NEPA and planning practice. This will encourage wider consideration of alternatives to reduce VMT and related GHGs and other harms to frontline communities.

---

[57] Eric Sundquist, et.al. op.cite.

[58] Pew Center for Global Climate Change, *Reducing Greenhouse Gas Emissions from U.S. Transportation,* 2003, https://www.c2es.org/wp-content/uploads/2003/05/reducing-greenhouse-gas-emissions-us-transportation.pdf; Georgetown Climate Center, *Issue Brief: States are in the Driver's Seat on Transportation Carbon Pollution,* March 24, 2003, https://www.georgetownclimate.org/blog/states-in-the-driver-eys-seat.html.

The California Air Resources Board staff collaborated with researchers at the University of California at Davis and University of Southern California to examine the existing scientific literature on the effects of key transportation- and land use-related policies as strategies to reduce vehicle miles traveled and greenhouse gas emissions. This was done to help strengthen the technical underpinnings of regional planning processes, and identify important data gaps and research needs in support of SB 375, California's law requiring regional transportation planning to consider VMT reduction strategies to meet state GHG reduction goals. Twenty-three policy briefs and accompanying technical briefs in this CARB-supported research provide strong evidence that should be used by US DOT and other states as they develop national and regional programmatic Environmental Impact Analysis to support NEPA evaluation of transportation projects within the context of transportation plans and programs.[59]

Some opponents of VMT reduction as a goal argue that traffic growth is inexorably tied to growth in the economy. Yet traffic growth has largely decoupled from economic activity across much of the world. For decades after New York City stopped investing in road capacity expansion in the late 1970s, the city has seen total traffic remain essentially flat while the city added millions of jobs and residents. Economic and population growth have been supported by greater use of walking, cycling, public transportation, and telework. Similar results have been seen in many other wealthy cities.

The Government of California has recognized that reducing VMT creates substantial benefits for health and the environment, beyond GHG reduction.

> *VMT mitigation also creates substantial benefits (sometimes characterized as "co-benefits" to GHG reduction) in both in the near-term and the long- term. Beyond GHG emissions, increases in VMT also impact human health and the natural environment. Human health is impacted as increases in vehicle travel lead to more vehicle crashes, poorer air quality, increases in chronic diseases associated with reduced physical activity, and worse mental health. Increases in vehicle travel also negatively affect other road users, including pedestrians, cyclists, other motorists, and many transit users. The natural environment is impacted as higher VMT leads to more collisions with wildlife and fragments habitat. Additionally, development that leads to more vehicle travel also tends to consume more energy, water, and open space (including farmland and sensitive habitat). This increase in impermeable surfaces raises the flood risk and pollutant transport into waterways.[60] VMT and Economic Growth. While it was previously believed that VMT growth was a necessary component of economic growth, data from the past two decades shows that economic growth is possible without a concomitant increase in VMT. Recent research shows that*

[59] California Air Resources Board, *Research on Effects of Transportation and Land Use-Related Policies*, https://ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/research-effects-transportation-and-land-use accessed April 4, 2023.

[60] Fang et al. (2017) *Cutting Greenhouse Gas Emissions Is Only the Beginning: A Literature Review of the Co-Benefits of Reducing Vehicle Miles Traveled*, https://rosap.ntl.bts.gov/view/dot/32254.

requiring development projects to mitigate LOS may actually reduce accessibility to destinations and impede economic growth.[61]

Colorado in 2019 set greenhouse gas goals and in 2021 adopted the Greenhouse Gas Transportation Planning Standard, which requires Colorado DOT and metropolitan planning organizations to create transportation plans that reduce GHGs and expand travel choices. Regional models showed that several planned interstate highway-widening projects in Denver would cause significantly increased GHG emissions. This led to the cancellation of those projects. Funds that had been programmed for widening I-25 in central Denver are now being redirected to create five Bus Rapid Transit corridors. MPOs are also required to allocate funding from federal programs to projects that cut emissions. If promised GHG reductions fail to materialize, further fiscal penalties redirect additional funding to GHG reducing projects.[62]
B. Federal Transportation Planning Process.

Four federal agencies (DOT, EPA, DOE and HUD, with CEQ in support) have signed a joint MOU committed to achieving seven goals, including the decarbonization of the transport sector, protecting exposed communities by reducing air pollution from transport, and achieving an equitable transition that includes assuring mobility for traditionally underserved communities.

For example, the MOU does not identify the need for the Federal Highway Administration (FHWA) adopt nationally consistent traffic modeling criteria to assure accurate projections of regional emissions of both GHGs and air pollutants to support reducing those emissions during each planning cycle to decarbonize surface transport as soon as possible, but not later than 2050.

To ensure that federal transportation investments are designed to achieve the Goals and Objectives described in the MOU, as part of its guidance on NEPA evaluation of climate and GHGs, CEQ should ask USDOT to:
1. identify and quantify the magnitude of both GHG emissions and traffic-generated health hazards, and the benefits that would be achieved by adopting mitigation strategies designed to reduce emissions, improve community health, and enhance mobility for non-drivers and underserved communities –
a. traffic and emissions modeling must be required for all projects requiring a NEPA review.
b. life-cycle CO2 emissions associated with infrastructure materials and construction must be accounted for and mitigated.
2. require criteria for performing traffic modeling to account for induced travel demand, changes in multi-modal accessibility when comparing alternatives, and recognize capacity

[61] Haynes et al. (Sept. 2015), available at https://www.its.ucla.edu/wp-content/uploads/sites/6/2015/11/Haynes_Congested-Development_1-Oct-2015_final.pdf

[62] James Braseull, Colorado's Greenhouse Gas Planning Standard Changes the Transportation Equation," February 3, 2023, https://transitcenter.org/colorados-greenhouse-gas-planning-standard-changes-the-transportation-equation/

limitations when forecasting future traffic, emissions, community exposures, and estimating the benefits of mitigation measures.

Current Approaches to Transportation Modeling Will Undercut Efforts to Reduce Emissions Funding

The Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA) both boost funding to transform the transport system towards zero emissions by 2050 and to remediate disparate adverse impacts of transportation systems. However, many states are poised to quickly lock-in decades of GHG emissions growth by spending hundreds of billions of dollars on wider and more extensive high-speed motorways that spur sprawl and traffic growth.

A December 2021 Issue Brief by the Georgetown Climate Center concerning the impacts of alternative approaches to invest the $600 billion in IIJA funding between 2022-2026 found that investments to add more lane miles will increase emissions because building more roads adds more traffic — known as "induced demand." Traffic expands to fill new lanes, adding more pollution. If 27% of IIJA transportation spending goes to highway expansion, CO2 pollution could be 0.2% lower in 2026 but 1.6% higher by 2032, as the road expansions induces more traffic demand.

Transportation Models Used to Justify New and Expanded Roadways are Erroneous and Obsolete

The transportation modeling methods used to justify often wasteful highway projects were developed in the 1980s when the computers employed were less powerful than today's baseline smart phones. Due to computer limitations of the past, traffic is modeled as if every road segment is independent using a Static Traffic Assignment (STA) algorithm which cannot properly:

- account for bottlenecks,
- constrain forecast traffic volumes to roadway capacity, or
- match actual speeds.

Since the 1980s, new features have been grafted on top of the STA the process including more complex mode choice models, activity-based models (ABM) and links to microsimulation. However, the underlying modeling STA DNA is unchanged. These limited, antiquated models are not reviewed or tested for accuracy after a project is built; but they are accepted by the federal government as an acceptable basis for developing projections of the climate and health-damaging emissions that will come from transportation projects.

The STA models in use routinely forecast future traffic volumes above roadway capacity and used to declare the immediate need for more capacity. To elected officials, community members and local businesses, this sounds like impending disaster. However, in reality, they are simply model errors. No roadway will ever carry a traffic volume over capacity, except perhaps for a few minutes before traffic breaks down.

An accurate model would not allow these over-capacity assignments. Instead, the model would adjust travel demand through changes in mode, destination, routes route and/or time of day, which is exactly how people make travel choices in response to congested conditions. In a scenario where population and jobs are added to a congested region without additional roadway capacity, an accurate model would forecast reduced demand when measured on a per capita basis. No modeled roadways would have traffic volumes exceeding capacity in either the base year or the future year.

Adding new roadway capacity in this hypothetical example releases constraints on traffic growth and causes induced demand. STA models fail to properly account for induced demand because that traffic volume is included in the no build alternatives as grossly overestimated over-capacity assignments and often explained away as "latent demand." Then, the STA models forecast similar traffic volumes for both no build and build alternatives. The traffic analysis falsely concludes that the build alternative can correct the impossible over-capacity situation while also denying that the project would induce demand. This framing has been repeated throughout the U.S. but is fundamentally wrong. It is never born out in reality, but FHWA does not require an analysis of the performance of the models after the project is built in order to see this error, much less correct it.

FHWA should require periodic MPO and state reporting on an important test of model validity: How well did the model forecasts by an agency five or ten years ago comport with current observed traffic and travel characteristics available today? However, this is rarely done, as most agencies throw away their data to avoid audits. Another test: How well do current models perform when applied to a scenario 5 or 10 years ago, comparing to observed travel data?

Induced demand has been researched extensively and is accepted by most researchers. Because the obsolete transportation models fail to accurately account for induced demand, the University of California Davis and the Rocky Mountain Institute have created induced demand calculators to help fill the void. However, these calculators cannot correct the errors in the traffic analyses in alternatives analyses. CEQ should ask U.S. DOT and project sponsor of NEPA evaluations to invest in better models to produce realistic and credible estimates of the impacts of transportation alternatives, while drawing on the use of such calculators in in the absence of appropriate regional models.

Beyond the problems listed above, the models are not set up in a way to account for economic changes in a corridor, telecommuting, the land use forms, the walkability of the community and other relatively common issues that impact travel demand.

Reforms Needed to Accurately Model Congestion and Emissions Results of Highway Projects

Existing US DOT modeling rules apply solely for purposes of regional conformity analysis in serious, severe, and extreme nonattainment areas (NAAs) – the South Coast and San Joaquin Valley, New York City, Houston, Atlanta, Phoenix, and Denver. Further rule changes could be

made to expand the scope of the rule to apply to other nonattainment areas (for example, to ensure a project or plan would not put the area into nonattainment), to NEPA analysis, and GHG evaluation. 40 CRF 93.122 Procedures for Determining Regional Transportation-related Emissions says, “By January 1, 1997, estimated of regional transportation related emissions used to support conformity determinations must be made at a minimum using network-based travel models according to procedures and methods that are available and in practice and supported by current and available documentation. These procedures, methods, and practices are available from DOT and will be updated periodically.”

To comply with established regulations, this rule should be updated to –

1) Disallow the use of any model in alternatives analyses where the volume-to-capacity ratio exceeds 110% for any time period in either direction for any important roadway in the region in either the base year or future years. Over-capacity assignments are model errors, and a 110% cutoff is a reasonable point where the errors become serious enough to exclude the model from application.

2) Model travel time and non-auto trips based on destination access measurers prior to the destination choice step. In current practice, increases in travel speeds are assumed to translate into travel time savings, even if the travel speed increases are realized through lengthening trip distances by blocking turn movements and corridor crossings. Travel time is determined by considering speed and distance; and today distance can be easily considered for all potential trips in a region using GIS and cloud computing to measure how many more destinations can be reached within a reasonable period of time. Additionally, modeling non-motorized trips is done post destination choice. In this formulation, non-motorized trips in the model can substitute only for very short auto trips. The decision to make a non-motorized trip generally is made prior to or simultaneously with destination choice, and these trips can substitute for longer auto trips. Modeling non-motorized trips should be moved ahead of destination choice and should be based on the land use variables that have been shown to significantly correlate with non-motorized trips including density, diversity, and design. Using destinations access, as Virginia DOT has since 2015, can accomplish this because travel between destinations can be measured for any mode of travel as opposed to our current travel demand models.

3) Require agencies to routinely compare and report on how regional travel forecasts from 5 and 10 years ago compare with realized travel patterns and how current forecasts are being adjusted to better account for factors that reduce forecast accuracy in light of this. The past accuracy of models and the projections they produce should be utilized by FHWA to inform how they update their rules, procedures, guidance, and tools going forward. That accuracy should also be included in any environmental documents so that resource agencies and the public know the extent of the margin of error to give the project sponsor’s projections and needed mitigation.

4) Update the model calibration process to emphasize travel times and speeds including matching recurring bottlenecks by time of day. Travel demand models are calibrated to traffic

counts even though the most important performance metrics extracted from the models are travel times and speeds. Until recently, travel time and speed data were either unavailable or very expensive to collect. Today accurate travel time and speed data are available 24/7 for every major roadway in the U.S. and these data are made available to state DOTs and MPOs. While it will be useful to continue checking model traffic volumes against counts, the primary calibration focus should be travel speed because these data are more accurate and comprehensive than traffic count data, and because the most critical model outputs in planning studies are travel speeds.

VII. NEPA Procedures Must be Reformed to Inform At-risk Communities of Health Threats from Transportation Facilities, and Provide Mitigation Needed to Protect Community Health.

In its interim guidance, CEQ reminds "agencies to incorporate environmental justice considerations into their analyses of climate-related effects, consistent with Executive Orders 12898 and 14008." CEQ's Interim *Guidance for greenhouse gas (GHG) emissions and climate* also emphasizes the importance of using the NEPA process to assess the impacts of GHG emissions on community health, and to identify mitigation measures that can avoid or minimize those impacts.

> The NEPA process calls for identifying potential environmental justice-related issues and meaningfully engaging with communities that proposed actions and reasonable alternatives (as well as the no-action alternative) may affect.
>
> This is important for all members of the public and stakeholders, but especially for communities of color and low-income communities, including those who have suffered disproportionate public health or environmental harms and those who are at increased risk for climate change-related harms. Agencies should engage such communities early in the scoping and project planning process to understand any unique climate-related risks and concerns. Agencies also should use the NEPA process to identify and analyze reasonably foreseeable effects, reasonable alternatives, and measures to avoid or minimize any such effects.

88 Fed. Reg. 1211.

Commenters are concerned that the cumulative health effects of all the pollutants emitted from the operation of large numbers of fossil fueled ICE vehicles concentrated at transportation facilities such as major highways, ports and airports, are not being analyzed for their impact on community health.

EISs for transportation projects rarely discuss the impact that exposure to air pollutants emitted from transportation facilities has on community health. Air pollutants emitted from such facilities are usually identified, and in most cases emissions of some pollutants are quantified in emission inventories. But emissions are generally not modeled to predict ambient concentrations except when a conformity determination is required under the Clean Air Act. Furthermore, community exposures to pollutants are rarely modeled. Even where exposures

are estimated through modeling, that information is not used to characterize the impact that exposure to pollution from a facility are likely to have on community health. Health impacts are still included in the definition of "effects,"[63] but are largely ignored in practice.

The interim Guidance directs agencies to include the impacts that climate change is having on community health. We ask that CEQ also recognize that the pollutants emitted from the combustion of carbon fuels include all the tailpipe pollutants that affect health, including fine particles (which are mostly elemental and black carbon), nitrogen oxides (formed during high temperature combustion), carbon monoxide (from incomplete combustion of carbon), ozone (formed in the atmosphere from the products of carbon combustion), and carbon compounds that are toxic air pollutants such as benzene, acrolein, aldehydes, 1,3 butadiene, and polycyclic aromatic hydrocarbons (PAHs). The electrification of mobile sources is a primary strategy for reducing or eliminating CO2 emitted from ICEs, but also has the benefit of eliminating all the other combustion products emitted from ICEs.

The cumulative health impacts of all of these combustion products need to be considered together along with the cumulative health benefits of eliminating all of these pollutants by converting mobile sources to zero emission technologies or by reducing vehicle use.

A. Justice40 Directs CEQ to Protect At-risk Communities.

These comments are submitted on behalf of many organizations, including those that represent BIPOC and low income communities that suffer from the environmental injustices of past government actions that have created disproportionate health risks from exposure to the pollution emitted from highways and other transportation facilities. EPA's past monitoring and NAAQS implementation policies before 2012 that refused to measure air pollution near transportation facilities, or compare such measurements with air quality standards, contributed to the greater health burden of air pollution borne by the residents of communities adjacent to highways, ports and airports. U.S. DOT's minimal implementation of NEPA that has consistently rejected requests to include health impact assessments in the NEPA review of projects have exacerbated the discriminatory impacts of EPA's monitoring and implementation policies on near-highway, near-port and near-airport communities.

To fulfill the President's commitment in Justice40 to correct the environmental injustices of the past and protect at-risk communities from future actions, commenters ask CEQ to clarify the analyses and practices required under NEPA for EISs to ensure that residents of these communities are protected from bearing any disproportionate, excess health burden in the future. Guidance is needed to direct agencies to –

- assess the cumulative impacts on community health, starting with an analysis of the existing health burden imposed on these communities by past decisions, often made

[63] 40 CFR § 1508(g)(4) (2020).

before NEPA was enacted or made without any assessment of the impacts that mobile source pollution would have on community health, to locate transportation themselves;

- perform health impact assessments to determine the cumulative health burden on a community for the purpose of assessing whether mitigation is needed to **enhance** the quality of the human environment even if expansion of a proposed facility will not increase exposure to harmful pollutants or worsen the health burden for an at-risk community ;
- determine acceptable health risks for determining whether the health burden caused by cumulative exposure to the full array of pollutants emitted from a transportation facility, including both pollutants governed by a standard and pollutants for which no air quality standard applies, must be mitigated;
- require a mitigation plan to eliminate exposures that cause unacceptable health risks to at-risk communities;
- include in modeling of project emissions all pollutants for which a state or national air quality standard is in effect, and not just those pollutant(s) which are required to be modeled for a CAA conformity determination;
- require that modeling by agencies to assess the impact of emissions from highways use the models and modeling procedures developed, tested, validated and approved by U.S. EPA for that purpose;
- require mitigation to be identified that will reduce emissions to the extent needed to avoid violating applicable air quality standards.

B. NEPA Guidance Must be Enhanced to Protect Communities Adjacent to Transportation Facilities That Bear a Disproportionate Health Burden.

Throughout EPA's recent rulemakings to establish emission standards for heavy duty vehicles and its proposal to revise the PM NAAQS, the Agency recognizes that people of color and low income families are overrepresented in the communities most at risk from exposure to air pollution, and suffer an incremental health burden as a result of that exposure.

> To compare demographic trends, we sorted 2045 baseline air quality concentrations from highest to lowest concentration and created two groups: Areas within the contiguous United States with the worst air quality and the rest of the country. We found that in the 2045 baseline, the number of people of color living within areas with the worst air quality is nearly double that of non-Hispanic Whites.

See EPA Truck rule: 88 Fed. Reg. 4310 (January 24, 2023).

EPA recognizes that PM emissions from transportation sources are a primary contributor to the incremental incidence of adverse health outcomes experienced by at-risk communities. In the recent truck standards rulemaking, EPA found that --

> … concentrations of many air pollutants are elevated near high-traffic roadways, and populations who live, work, or go to school near high-traffic roadways experience higher rates of numerous adverse health effects, compared to populations far away from major roads.

88 Fed. Reg. 4422.

For the truck rule, EPA conducted a demographic analysis of populations exposed in the near-highway environment.

"Relative to the rest of [4423] the population, people living near FAF4 truck routes are more likely to be people of color and have lower incomes than the general population." *Id.* "[H]omes with a non-White householder were 22–34 percent more likely to be located within 300 feet of these large transportation facilities than homes with White householders. Homes with a Hispanic householder were 17–33 percent more likely to be located within 300 feet of these large transportation facilities than homes with non-Hispanic householders." *Id.*, 4423.

Commenters submit these comments to flag policies and practices that must be changed to provide meaningful protection for the residents of these at-risk communities near transportation facilities, and to implement the President's commitment to protect these communities in Justice40.

1. EPA Policies and Procedures Put Communities Near Transportation Facilities At-Risk.

EPA's interpretation and implementation of the Clean Air Act has failed to deliver the protection from air pollution promised by the Act, and has contributed to the elevated health burden borne by communities adjacent to transportation facilities.

First, EPA has interpreted the CAA to establish air quality standards pollutant by pollutant. In setting pollutant-specific standards, EPA considers only the health effects data that establishes the health effects contributed exclusively by that pollutant. For example, the Agency has been careful to exclude from the evaluation of the health effects of particulate matter studies that assess the impact on health from public exposure to highway pollution because emissions from highways include the full array of criteria pollutants (PM10, PM2.5, CO, NO2, SO2 and lead) and 92 toxic air pollutants that EPA has identified as emitted from tailpipes. The result is that the interactive and cumulative effects of exposure to multiple pollutants are not accounted for in any air quality standard, and attainment of any standard does not provide protection from the health effects caused by exposure to the complex mix of pollutants emitted from highways, ports or airports.

Second, EPA's current regulatory approach for implementing national ambient air quality standards (NAAQS), which it proposes to retain in the proposed revision of the NAAQS for PM2.5, relies on air quality monitors to protect communities from the effects of expanded transportation facilities where the increased operation of mobile sources will add emissions and increase community exposure to PM and the other pollutants emitted from tailpipes. EPA's monitoring policy does not protect at-risk communities because of the obstacles communities must overcome to have monitoring stations sited in proximity to where they are exposed, and the nearly two decade delay inherent in EPA's implementation of the NAAQS between identifying the potential violation of a NAAQS and the final implementation of control measures to eliminate the violation.

The Agency's reliance on monitors allows at-risk communities to be exposed to increased emissions from most expanded highways without any prior review to ensure compliance with

air quality standards. Only projects located in designated "nonattainment areas" are subject to prior modeling analysis to demonstrate that increased emissions will not violate a NAAQS. But most highway projects around the Nation will be located in areas that are currently designated attainment for PM2.5, and are likely to remain attainment after the annual NAAQS is revised.

In areas without an existing near-highway monitor, EPA's monitoring policy will delay nonattainment designations until monitoring demonstrates NAAQS violations. Not enough monitors will be deployed to detect all potential existing transportation-related hot spots. But even where new monitoring stations are deployed, it will take two years for EPA approval of a revised monitoring network, another 6 to 12 months to deploy each monitor, and three years to collect the data required by EPA to prove a violation.

Data proving a violation is not enough. EPA must designate the area as "nonattainment" by rulemaking, which EPA often defers for years.

EPA policy requires three years of valid air quality data before the monitoring data can be used to take regulatory action. Then the State and EPA must designate the area as non-attainment which requires a rulemaking that EPA has interpreted to be discretionary after initial designations are made under § 107(d). A redesignation can take two years. After redesignation to nonattainment, the State has three years to submit a SIP revision containing a control strategy for the area which is not required to be fully implemented until 6 years after EPA approves the SIP. Depending on how long a community must advocate for the siting of a regulatory monitor in the hot spot location, together these steps will take a minimum of 15 years, and more likely 18 or 20 before control measures are implemented to reduce emissions.

Thus vulnerable BIPOC and low SES communities near transportation projects in attainment areas will not be informed if increased vehicle emissions contribute to air quality in violation of the NAAQS, and will be exposed to pollutant concentrations that cause serious harm to health. EPA's current practice offers no protection, and no recourse, for communities in this situation.

Third, EPA's recently adopted truck rule establishing tighter NOx standards will not achieve significant reductions in emissions from medium and heavy-duty vehicles in this decade because it only applies to new vehicles sold beginning in 2027. These standards will have little impact on air quality for at least a decade until significant portions of existing truck fleets are replaced with 2027 and later vehicles.

In addition, the modeling analysis performed for the truck rule demonstrates that even as late as 2045 the emission reductions required by the rule will not be sufficient to provide for attainment of the 2012 national ambient air quality standard for PM2.5 (NAAQS) in 10 counties with 23 million residents, and will be within 10 % of the 2012 NAAQS in 8 more counties. 88 Fed. Reg. 4421, Table VII-2. After the NAAQS is made more protective, all 20 counties will remain in nonattainment between now and 2045 even after implementation of the more stringent emission standard for trucks.

Furthermore, the large scale modeling performed for the truck rule does not address the localized impacts experienced by residents near transportation sources: "the spatial resolution of the air quality modeling is not sufficient to capture very local heterogeneity of human exposures, particularly the pollution concentration gradients near roads…" Id., 4310. This

means that many communities near transportation facilities in hundreds of other counties not flagged by EPA's regional models will experience violations of the revised NAAQS. Other communities living in areas attaining the NAAQS, but close to the standard will also be at risk of suffering from unlawful levels of pollution if facilities are expanded to attract more mobile sources that emit more pollution. NEPA Guidance must protect these communities by assuring that expanded transportation facilities receive careful scrutiny to ensure that the NAAQS are not violated.

EPA's modeling also shows that these more stringent standards will not be sufficient to attain the ozone NAAQS in large metropolitan areas where 28 million Americans reside. 88 Fed. Reg. 4420, Table VII-1.

EPA's policies and procedures for implementing the PM NAAQS to control PM emissions from transportation sources will determine whether at-risk communities are protected. As discussed in detail throughout these comments, current monitoring and SIP development practices will not fulfill the President's promise in Justice40.

2. NEPA Requires That Impacts on Air Quality and Community Health, and Alternatives and/or Mitigation to Protect Communities from Existing or Future Harm Be Identified and Discussed Before Project Approval.

To protect at-risk communities CEQ must ensure that NEPA is implemented to –

1) develop the information needed to inform communities of their actual total health risk from exposure to the mix of pollutants emitted from transportation facilities that are not prevented by pollution-specific standards;
2) provide a basis for determining acceptable community health burdens from exposure to the mix of pollutants;
3) identify and consider mitigation sufficient to enhance air quality where necessary to reduce community exposures to levels consistent with acceptable community health burdens;
4) require modeling as the basis for assessing the impact of transportation project emissions to prevent future violations of applicable air quality standards; and
5) require mitigation that reduces emissions to levels that will not violate NAAQS.

Following are case examples of the failure of environmental project reviews to fill the data gaps needed to adequately protect community health. These cases highlight the need for CEQ Guidance to fill these data gaps to ensure informed decisionmaking. The first case involves the I-70 expansion through Hispanic communities in north Denver in which FHWA refused to perform any analysis of the impacts on community health that would result from a 30% increase in traffic and the resulting increased community exposure to tailpipe pollutants. The second is the development of SR-47 as a dedicated facility for trucks carrying cargo from the ports of L.A. and Long Beach through the adjacent communities located between the ports and I-405.

A. The Need for Universally Applicable Pre-Construction Modeling and Health Impact Assessment is Demonstrated by the Failure to Protect Communities Next to I-70 in Denver.

The I-70 Project involved the addition of 4 primary travel lanes to the 6 lanes that carried traffic between the interchange with I-25 (colloquially referred to as the "Mousetrap") and Tower Road east of Pena Boulevard that provides regional access to the Denver International Airport. The widened right-of-way passes through three predominantly Hispanic neighborhoods of Swansea, Elyria and Globeville, involved the taking of hundreds of homes and businesses that comprised a dense urban area formerly served by 46th Avenue, a regional arterial highway. Two elementary schools are located adjacent to the right-of-way and two more are nearby. Children attending the schools walk along the highway from homes near the highway to a school next to the highway. The expansion also brought hundreds of homes with thousands of residents a block closer to the highway, and divided a tight-knit ethnic community by removing a highway elevated above numerous street crossings at grade, and replacing it with a 30 feet deep trench with only five major arterial crossings.

These neighborhoods include many small and medium sized businesses that contributed along with traffic emissions to the highest concentrations of PM in the Denver metro area. The Mousetrap carried 326,000 vehicle trips/day in 2015, making it the largest source of traffic emissions between Chicago and the L.A. Basin. Traffic modeling for the Project estimated that AADT on I-70 would increase by 30%, bringing total Mousetrap AADT to over 375,000 trips per day. The area had been designated nonattainment for PM10 in the 1970s and 80s, but was redesignated as a maintenance area in 1996. The area had not recorded any violations of the PM2.5 NAAQS.

1. Health Impact Assessment Denied Despite Strong Evidence of Severe Health Burden Linked to Highway Pollution.

A community health report comparing the health status of the Hispanic neighborhoods where the I-70 Project is located with each of Denver's nine council districts had been published by Denver Environmental Health (DEH) before the draft EIS was released for public comment.[64] The DEH report showed that neighborhoods located along I-25 and I-70 experienced significantly worse outcomes for multiple health indicators that EPA had found were closely linked to particulate matter air pollution. Comments submitted to FHWA on the Draft EIS for the Project summarized the data from the DEH report and requested a Health Impact Assessment:

> The data reported by DEH , HIA, Fig. 6, show that residents in the four city council districts where I-70 is located.(1, 8, 9, and 11) have the highest cardiovascular mortality rates. Residents in city council Dists 1 and 9 experience 30% greater cardiovascular mortality than dist 2 (213 vs. 155). In districts 8 and 11, respectively, cardiovascular mortality is 77% higher than dist 2 (275 vs. 155), and 74% higher (270 vs. 155). On average, cardiovascular mortality in these four council districts along I-70 is roughly 50%

[64] HEALTH IMPACT ASSESSMENT OF GLOBEVILLE AND ELYRIA SWANSEA NEIGHBORHOOD PLAN, Denver Department of Environmental Health (April, 2014).[attached as Exhibit Health -1].

greater than other parts of the city. These are remarkably huge differences in cardiovascular mortality, the largest single cause of death in Denver and the U.S.[65]

These massively greater mortality rates obviously contribute to increased years-of-life-lost. Missing from the final DEH report, but no less relevant to the need for a NEPA analysis of health risks, is the discussion of years-of-potential-life-lost (YPLL) that was included in the draft HIA, at p. 9 (published for comment in April). The draft described this metric as commonly "used as an indicator of health equity. Generally, this is a measure of premature death before the age of 75 compared across a population or geographic area. The assumption is that a higher number indicates inequitable social or physical determinants of health. Data from Denver Health indicate that “years of potential life lost” is higher in Globeville and Elyria Swansea than in Denver overall." The draft reported that years-of-life-lost, averaged across the community, is 3.5 years greater for the residents of GES neighborhoods compared to other Denver residents. This means residents of these neighborhoods are losing 50,000 years of life annually compared to other Denver neighborhoods.

The other adverse health outcome for which the disparity between the GES neighborhoods and other areas of the City is quantified is hospitalization for childhood asthma. The final DEH report, Fig. 7, shows 40% greater incidence (38.6 vs. 28.5 admissions/1,000) of hospitalization of children in Elyria/Swansea, and 20% higher in Globeville than the rest of the city. The additional emissions from the train traffic on the main line running between Elyria and Swansea is a plausible explanation for the higher incidence in these neighborhoods. Certainly 40%, and even 20% more children hospitalized for asthma is a significant adverse health outcome for a community that also suffers from other adverse social and economic factors.

The facts that 1) the GES neighborhoods have 3.5 years shorter longevity, or 50,000 years of life lost, compared to the rest of Denver (which was shown by the YPLL data presented in the draft report, but purged from the final), 2) the residents in the districts along the I-70 corridor experienced 50% higher cardiovascular mortality than other parts of the city, and 3) that significantly more children in GES neighborhoods require hospital care for asthma strongly suggests that these adverse health outcomes are linked to air pollution. There is enough variability in socio-economic factors across the four council districts that comprise north Denver that socio-economic factors alone cannot account for higher cardiovascular mortality rates in all four I-70 districts. Some other extrinsic factor, such as air pollution, must be a causative factor.[66]

---

[65] Yuhnke, Robert, THE SUPPLEMENTAL DRAFT EIS FOR PROPOSED EXPANSION OF I-70 EAST MUST BE REVISED TO ADEQUATELY DISCLOSE IMPACTS OF EMISSIONS ON COMMUNITY HEALTH AND AIR QUALITY (hereinafter “I-70 DEIS COMMENTS,” submitted to Colorado DOT and FHWA, October 31, 2014) [attached hereto as Exhibit Health – 2].

[66] I-70 DEIS COMMENTS, 3-5.

Based on these data showing the disproportionate incidence of observed adverse health outcomes, the DEH identification of air pollution as the only causative factor linked to these disease outcomes, EPA's findings in its 2012 review of the PM NAAQS that PM is a cause of these diseases, and the high emissions of toxic air pollutants in the neighborhoods near I-70,[67] the comments requested that Project emissions be evaluated for their impact on community health.

Comments requested modeling to determine the increased community exposure to Project emissions, that a Health Impact Assessment (HIA) be performed to estimate the magnitude of the increased health burden the community would suffer, and that the health benefits of two mitigation strategies be investigated. The community proposed two alternatives that would significantly reduce Project emissions: (i) re-routing interstate truck traffic onto I-270 around the periphery of the city, and (ii) prohibiting the operation of diesel trucks on the Project segment through the highest density neighborhoods between the Mousetrap and Colorado Boulevard.

CDOT and FHWA refused to prepare an HIA as part of the NEPA review, and refused to evaluate either the air quality or health benefits of the proposed alternative because they would not meet the narrowly defined purpose and need. The agencies also refused to investigate the cumulative health effects of exposure to multiple pollutants emitted from the Project, and refused to model Project emissions for their impact on attainment of the NAAQS for PM2.5.

2. Project Not Modeled for PM2.5 Despite Disproportionate Health Burden and Evidence of NAAQS Violation.

To make the conformity determination required by § 176(c) of the CAA as a pre-condition for the award of federal highway funds for the Project,[68] FHWA modeled the preferred alternative of the Project for PM10. When the peak modeled concentration from Project emissions were added to monitored background PM concentrations as required by EPA's Hot Spot Guidance,[69] the total was 154.2 µg/M3. The Project miraculously passed by 0.8 µg/M3 where 155 µg/M3 would have violated the NAAQS.

The I-70 DEIS Comments noted that the emissions inventory prepared for the PM10 modeling showed that 57% of future Project PM emissions would be less than 2.5 µm in size. By applying the simplistic assumption that PM2.5 particles would constitute 57% of modeled PM10 concentrations, the project would add more than 20 µg/M^3 of PM2.5 sized particles to background concentrations. The design value at the nearest PM2.5 monitor was over 20 µg/M^3. This simplistic calculation implied that the total PM2.5 would exceed 40 µg/M^3, well above the 35 µg/M^3 level of the 24-hour NAAQS.[70]

---

[67] *Id.,* 5 - 11.
[68] 42 U.S.C. § 7506(c); 40 CFR § 93.123.
[69] "Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas," (OTAQ, U.S. EPA, December 2010) [available from OTAQ Transportation Conformity website].
[70] I-70 DEIS COMMENTS, 12 -14.

Based on this simplistic calculation, the community expressed a legitimate concern that Project emissions would expose them to dangerous levels of PM in violation of the NAAQS. They submitted comments asking FHWA and CDOT, with copies to EPA Region VIII and the Colorado Air Pollution Control Division, to run the EPA-approved models for PM2.5.[71]

FHWA formally responded to the comments by ignoring the evidence suggesting that Project emissions would violate the NAAQS, and instead prepared an air quality analysis that presented the results for PM10 but contained no mention of PM2.5.[72] In its response to comments, FHWA stated that it had no obligation to model pollutants to determine compliance with NAAQS for which the area was attainment. They offered no technical response to the contention that the threat of a NAAQS violation was a significant impact on the human environment that required the application of EPA's approved models for investigating highway emissions under NEPA. The task was not onerous since it simply involved asking the models used to estimate PM10 concentrations to also calculate PM2.5 concentrations. No additional model imputs were required, and very little modeling staff time to run the models for both pollutants. Yet despite the ease of obtaining the data, FHWA refused to obtain or disclose the information. If the CAA did not require it, FHWA would not do it. No doubt they suspected the models would show a violation which they were not willing to acknowledge. It was simply easier not to know. None of the other agencies responded to the community's pleas for help.

Trying to protect themselves, the community raised the resources to fund Dr. Gregory Rowangould, a modeling expert under contract to EPA to test and evaluate models for estimating the impacts of highway emissions, to perform the modeling analysis. Dr. Rowangould obtained the traffic and meteorological data and grid receptors used by FHWA to model PM10, and ran the exact same EPA models using the emissions inventory for PM2.5.

Dr. Rowangould reported the following results:

> Using the procedure described in EPA's 2010 Guidance, the Project contribution is 14.6 µg/m3, which under EPA's rounding convention is treated as 15 µg/m3. When added to background the design value is 40 µg/m3.
>
> Using the procedure in EPA's 2015 Guidance, the modeled Project contribution is 11.6 µg/m3 which is rounded to 12 µg/m3. When added to background, the design value is 37 µg/m3.
>
> The 24-hour NAAQS for PM2.5 is 35 µg/m3. Regardless which design value procedure is applied, the analysis establishes that Project emissions are expected to violate the NAAQS. The major difference between the two procedures is the magnitude of emission reduction needed to demonstrate compliance with the NAAQS.[73]

After these results were presented to FHWA and CDOT, no action was taken by either agency to investigate control measures to prevent the NAAQS violations. The community remains at risk from exposure to pollution levels expected to violate the 24-hour NAAQS. No analysis was then,

---

[71] *Id.,* 14.

[72] I-70 East Draft Air Quality Conformity Analysis, FHWA [attached as Exhibit Health – 3].

[73] Rowangould, G., "Modeling PM2.5 Emissions from Phase I of the I-70 East (Central 70) Project," (Sustainable Systems Research, March 8, 2018), p. 4. [attached hereto as Exhibit Health-4].

or has since been performed to determine the impact that Project emissions are likely to have on the annual PM2.5 NAAQS.

3. Project Analyzed for Health Risks, but Not for Total Health Burden Imposed on Community.

The second example involves the expansion of SR-47 as a dedicated route for trucks carrying cargo from the ports of Long Beach and Los Angeles to the I-405 through mostly Hispanic residential neighborhoods in Wilmington and Carson. This route was designed to provide exclusive port access for heavy duty drayage vehicles that would be diverted from the heavily travelled I-110 and I-710, but would triple emissions in the communities adjacent to the SR-47.

Analyzed in 2008 in an EIS/EIR prepared pursuant to both NEPA and the California Environmental Quality Act (CEQA), the Project review included a Health Risk Assessment (HRA).[74]

This report is submitted to demonstrate that there is a history of including community health impact assessments in an EIS, that the methodology was available at least 15 years ago, that the product of the analysis provided useful information to the Project sponsor and the community, and that the information developed provided the basis for identifying mitigation that reduced community health risk.

The analysis attempted to address a number of the concerns that were entirely ignored in the I-70 example, including modeling to estimate community exposures to the pollutants, consideration of the cumulative health impacts of exposure to multiple tailpipe pollutants, a comparison of exposures and health risks with different project alternatives, quantification of health risk, and comparison of calculated risks with criteria for determining acceptable health risk.

However, the SR-47 HRA was not perfect, and is not offered as a model of what can or should be performed today in a community health impact analysis. The analysis assessed primarily the cancer risk attributable to exposure to a mix of pollutants causally linked to cancer including particulate emitted from diesel engines and benzene, 1,3 butadiene and aldehydes from gasoline engines. The risk that pollutant exposures would contribute to other major health outcomes associated with tailpipe pollutants, including cardio-vascular disease, asthma, and chronic obstructive pulmonary disease (COPD), were not investigated. All diseases of air pollution known to contribute significantly to the burden of disease in at-risk community should be included in community health impact assessment.

We particularly highlight the failure of the methodology used for the SR-47 HRA to consider the total health burden imposed on the community by the cumulative effect of exposure to all pollutants emitted from sources in the area. The HRA only compared the "incremental health risk increases due to the project" with unacceptable risk criteria. "[H]ealth risk thresholds apply

[74] "Human Health Risk Assessment for the Schyler-Heim Bridge Replacement and SR-47 Expressway Project," prepared for Alameda Corridor Transportation Authority (Weston Solutions, October 2008) [attached as Exhibit Health – 5]..

to incremental increase due to project emissions, and the significance level would be based on the health risk increases, not the absolute health risk values." [75]

This approach ignores the cumulative impact that a project has on community health by failing to recognize that prior actions have contributed to exposures that may be causing harm, and that the proposed project will exacerbate harm to community health. CEQ recently restored the requirement to consider cumulative effects, based on its conclusion that –

> consideration of reasonably foreseeable cumulative effects allows agencies and the public to understand the full scope of potential impacts from a proposed action, including how the incremental impacts of a proposed action contribute to cumulative environmental problems such as air pollution, water pollution, climate change, environmental injustice, and biodiversity loss. Science confirms that cumulative environmental harms, including repeated or frequent exposure to toxic air or water pollution, threaten human and environmental health and pose undue burdens on historically marginalized communities.43 CEQ does not consider such harms to be inconsequential or irrelevant, but rather critical to sound agency decision making. By restoring the phrase ''cumulative effects,'' this final rule will make clear that agencies must fully analyze reasonably foreseeable cumulative effects before Federal decisions are made.

87 Fed. Reg. 23,467.

A consequence of the approach used in the SR-47 HRA is that each new project may add a small insult to community health, itself not sufficient to trigger thresholds for determining unacceptable risks, and require mitigation. This approach partly accounts for the accumulated health risk borne by frontline communities today. To reverse the harm done, that approach must be rejected.

The SR-47 approach effectively defeats the directive in NEPA and 40 CFR § 1502.1 that an EIS must not just avoid or minimize additional harm, but must also consider alternatives and mitigation needed to enhance and restore the quality of the human environment where harm is already occurring.

Applying that statutory and regulatory requirement to human health, an EIS should establish the baseline health burden borne by a community as a consequence of prior actions, and determine whether that health burden is unacceptable and requires mitigation before determining whether the impact added by a proposed project will worsen the health burden for a community.

C. Guidance is Needed to Protect Health of At-risk Communities.

These examples are submitted for two reasons:

1) to demonstrate that EPA's current practices and policies are not adequate to protect communities from the health threats posed by emissions from transportation projects because they do not –

[75] HRA, 2.3 Risk Assessment Approach, 25.

(a) establish standards adequate to protect health from exposure to multiple pollutants that have additive or synergistic adverse impacts on health;
(b) require that pollutants governed by a NAAQS be modeled and compared with the NAAQS in areas designated attainment for PM2.5,
(c) require pre-construction review of transportation projects to **prevent violations** thereby allowing communities to be exposed to PM2.5 or other transportation pollutants in violation of the NAAQS for up to 20 years before corrective action is taken, and
(d) protect communities from suffering a worsened health burden by failing to provide any effective recourse to protect the community.

2) to support the additional NEPA Guidance outlined above that we request CEQ issue to protect at-risk communities near transportation facilities from the health burden imposed on them as the legacy of past decisions that failed to recognize and mitigate impacts on health, and from new proposed new actions based on EIS practices that still do not assess the additional health risks imposed upon communities, do not inform them of the additional impacts that will exacerbate the consequences of past decisions, and that fail to provide an opportunity to advocate for mitigation that will provide meaningful protection from the cumulative impacts of past and proposed future actions.

VIII. CONCLUSION.

Revisions and supplements to the current NEPA Guidance for Climate Change are needed for NEPA and CEQ to play a meaningful role in making and implementing the agency policies needed to achieve the emission reductions needed to stabilize the climate and end the warming, and to protect communities near transportation facilities from the health burden imposed by exposure to pollution emitted from transportation sources.

We appreciate CEQ's consideration of the approach we propose to establish a decisionmaking framework designed to tackle the climate challenge.

Respectfully submitted,

Transportation for America
Beth Osborne

RMI
Ben Holland

Sierra Club
Katherine Garcia

Elders Climate Action
Robert Yuhnke

Institute for Transportation Development Policy
Michael Replogle

Southern Environmental Law Center
Garrett M. Gee

Equiticity
Ellen Partridge

Coalition for Smarter Growth
Stewart Schwartz

National Association of City Transportation Officials
Corrinne Kisner

Principal authors –

Robert Yuhnke

1972-78 Assistant Attorney General, representing Pennsylvania Department of Environmental Resources, Air Quality Bureau, in CAA enforcement and rulemaking;

1978 -79 Assistant Regional Solicitor, US Department of Interior, Office of Surface Mining;

1980 – 1991 Senior Attorney, Environmental Defense Fund, created Clean Air program, contributed to 1990 CAA Amendments.

1992 – 2008 Attorney, representing at-risk communities in highway litigation

2008 – 2013 Director, Southwest Energy Efficiency Program, Transportation Program

2013 – 2019 Attorney representing at-risk communities

2019 – present Elders Climate Action, Policy Committee

Michael Replogle2021-present:

Senior advisor to Institute for Transportation and Development Policy (ITDP), World Bank, and other groups.

2018-present: Member EPA's Mobile Source Technical Review Subcommittee of the Clean Air Act Advisory Committee (CAAAC).

2015-2021: Deputy Commissioner for Policy, New York City Department of Transportation

2021: Adjunct Professor, New York University's Wagner School of Public Service

2013-2015: Visiting Professor, China Academy of Transportation Sciences, Beijing.

2008-2015: Founder and Managing Director for Policy, Institute for Transportation and Development Policy

1993-1996: Member of US DOT's Travel Model Review Advisory Committee

1991-2008: Transportation Director, Environmental Defense Fund

1982-1991: Transportation Coordinator, Maryland National Capital Parks and Planning Commission, Montgomery County, MD.

1979-1982: Research Coordinator, Public Technology, Inc. the technical arm of the National League of Cities.