

# Conference Recap

of the

# Transportation Research Board 100<sup>th</sup> Annual Meeting

Andrew Eilbert

February 2021



U.S. Department of Transportation

**Volpe Center**

*Advancing transportation innovation for the public good*

# Common Themes

- **Climate change, transportation equity, and public health**
  - Renewed interest in greenhouse gas (GHG) mitigation, accessibility & inclusion, and environmental justice under new administration
  - Interdependencies of transportation equity with climate change and COVID-19
    - Disproportionate impacts on disadvantaged communities and people of color, who are more likely to be in the service industry and to rely on public transit
- **Public-private partnerships**
  - Many speakers emphasized reestablishing or forming new communication channels, research collaborations, and data sharing efforts
    - Challenged government to work with private sector to tackle climate change and equity together

# Comparing Criteria Pollutants & GHGs

## ATMOSPHERIC DIFFERENCES

### Criteria Pollutants / Mobile Source Air Toxics\*

- Short-lived in the atmosphere (days to weeks)
- Impacts are local / regional

\*Criteria pollutant emissions are subject to ambient air quality standards, while MSATs are not



Photo credit: USEPA

### CO<sub>2</sub>

- Long lived in the atmosphere (years to millennia)
- Result in increased global atmospheric concentrations regardless of when or where they occur
- **Concentrations will tend to increase, even if emissions decrease**
- Impacts are inherently global



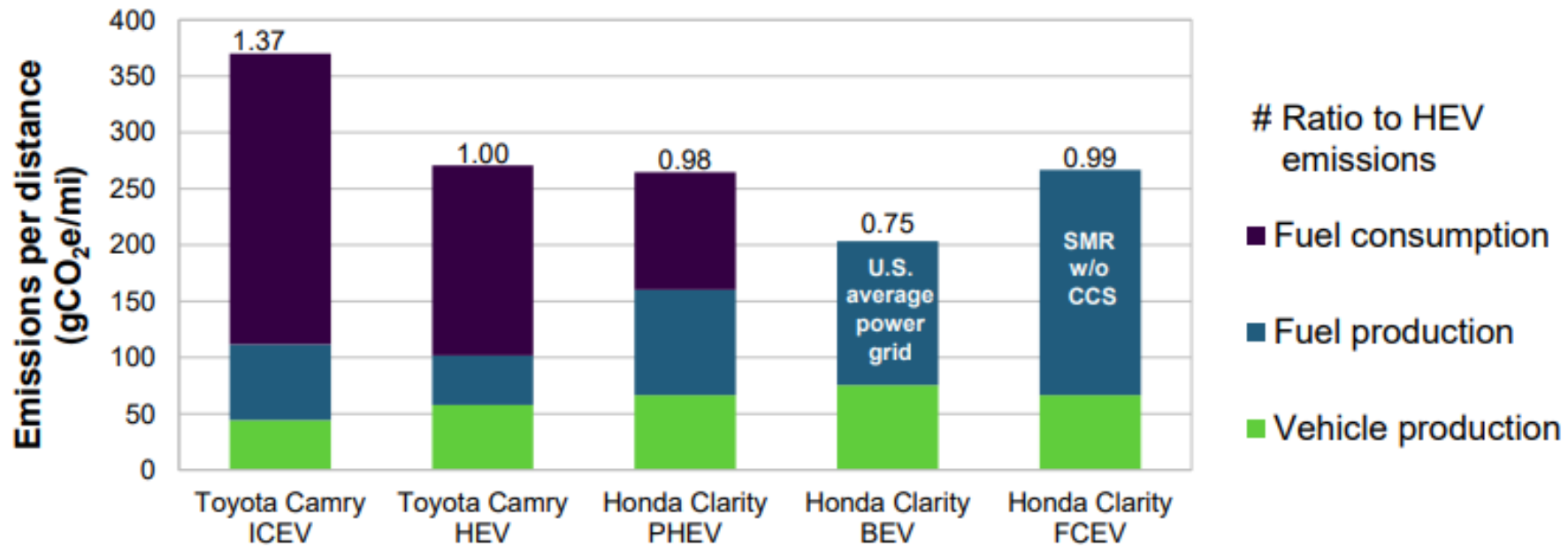
Photo credit: NASA

# New AQ & GHG Mitigation Committee

- This year the TRB Air Quality Committee (ADC20) has been expanded to the [Air Quality and Greenhouse Gas Mitigation Committee](#) (AMS10)
  - Committee leadership has been retained, but scope will be broader
    - AQ & GHG (AMS10): Chair, Doug Eisinger (Sonoma Technology, Inc.)
  - Expecting to work more closely with related environmental committees
    - Energy (AMS20): Chair, Rebecca Dodder (US EPA ORD)
    - Alternative Fuels (AMS40): Chair, Rachael Nealer (US DOE EERE)
- Invited presentations at AMS10 committee meeting
  - [Insights into Future Mobility](#), Randall Field (MIT Energy Initiative)
  - Deep CO<sub>2</sub> mitigation in road transport, Jon Axsen (Simon Fraser Univ.)

# Insights into Future Mobility

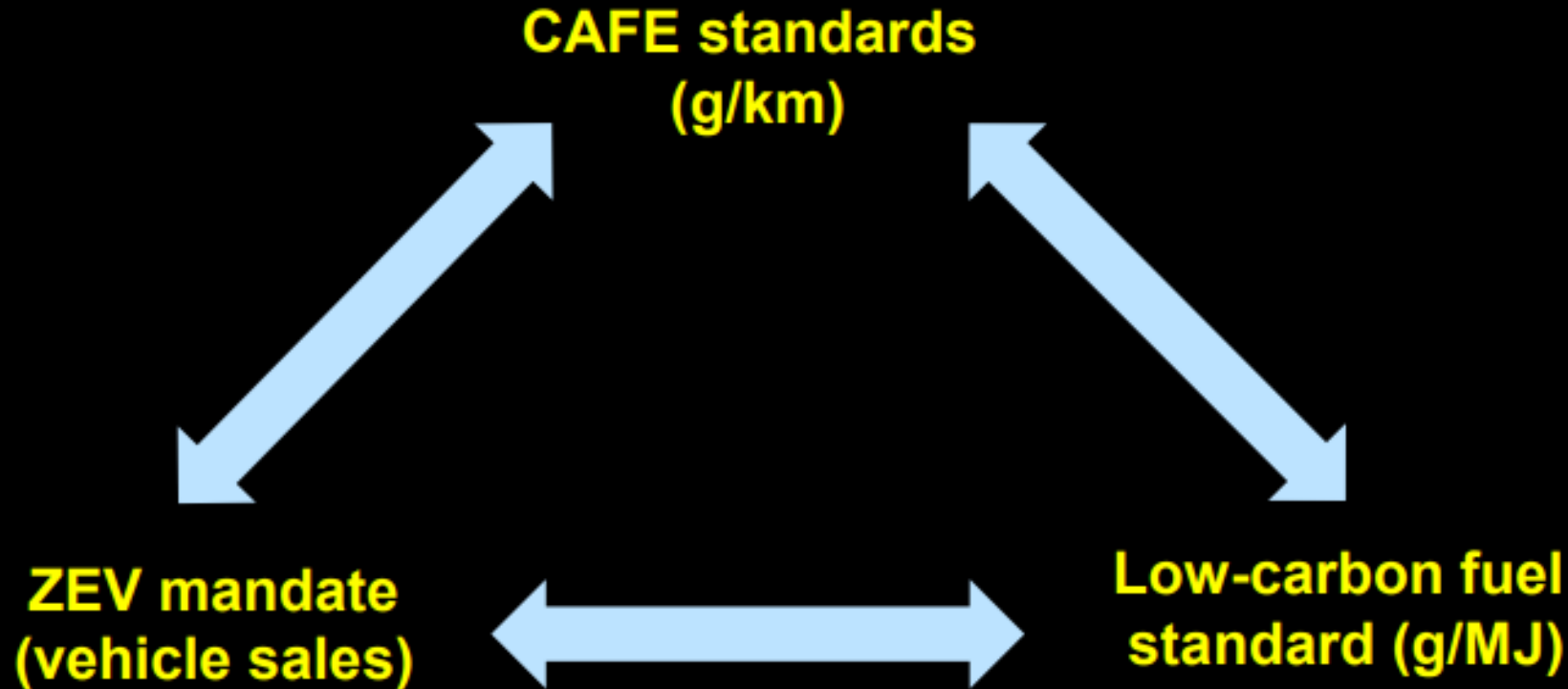
## Greenhouse gas (GHG) emissions for vehicles with different powertrains in the U.S. today



- **BEV lifecycle emissions are about 55% of comparable ICEVs.**
- HEV, PHEV and FCEV emissions are all similar and fall between ICEV and BEV emissions.
- BEV emissions are based on the average carbon-intensity of U.S. electricity today
- FCEV emissions are based on hydrogen from steam methane reforming (SMR), no carbon capture system (CCS)

# Deep CO<sub>2</sub> Mitigation in Road Transport

## Priorities: The supply-focused policy “Triad”



**Good “complements”:** carbon pricing, purchase incentives, charging infrastructure (home, work, public)

[Axsen \(2021\)](#)

# Marrying GHG Mitigation and AQ Improvement Policies

- Focused on perspectives from state and local agencies
  - Maine, Vermont, Massachusetts, California, Washington State, Puget Sound, DC
- Dept. of Energy's Clean Cities tools for GHG estimates
  - IdleBox Toolkit, AFLEET, Alt Fuels Data Center Vehicle Cost Calculator
- Projects with potential AQ & GHG co-benefits
  - Car and bike sharing, anti-idling programs, fleet electrification, charging stations
- Vehicle and infrastructure incentives
  - CMAQ funding, federal tax credits, state-level subsidies, etc.

# Funding Criteria for Transportation Projects

## Project Selection Process

### Air Quality / Climate Change criterion

- Evaluates the potential for each project to reduce reduces emissions from:
  - Reducing trips
  - Reducing vehicle miles traveled
  - Improving travel flow / reducing vehicle idling
  - Converting vehicles to cleaner fuels
- CMAQ projects only:
  - Air quality score based on cost effectiveness
  - $(\text{CMAQ } \$ \text{ requested} / \text{Useful life}) / \text{Emissions reduced}$










# Example Vehicle Replacements

## Electrification and Equity

- Targeting low-emission vehicles
- Time-limited income-eligible higher-efficiency used vehicle incentive
- Used electric vehicle incentive

Current Vehicle		Replacement Vehicle	
2011 Ford F150 2WD (8 cyl.) MPG = 13/18 		2017 Ford F150 2WD (6 cyl.) MPG = 19/26 	
Fuel Savings @ \$2.30/gal = <b>\$3,306/ 6yrs.</b>	Emissions Saved = <b>15.7 MTCO<sub>2</sub></b>	Cost to State per metric ton reduced = \$128	
2011 Chevrolet Equinox AWD MPG = 20/28 		2017 Toyota RAV 4 Hybrid AWD MPG = 34/30 	
Fuel Savings @ \$2.30/gal = <b>\$1,596/ 6yrs.</b>	Emissions Saved = <b>7.6 MTCO<sub>2</sub></b>	Cost to State per metric ton reduced = \$264	
2011 Ford Fusion FWD MPG = 23/32 		2016 Ford Fusion Energi FWD Plug-in Hybrid MPGe = 88/MPG 38 	
Fuel Savings @ \$2.30/gal = <b>\$1,728/ 6yrs.</b>	Emissions Saved = <b>18.1 MTCO<sub>2</sub></b>	Cost to State per metric ton reduced = \$111	

Taylor, Maine DOT (2021)

# Collaboration with State Agencies

## / Potential research opportunities, tool development needs

- Primary research on behavioral response to projects/programs.
  - Scale and durability of GHG impacts
  - Attribution between complementary investments
  - Robust experimental designs
- Co-pollutant emissions from drop-in fuels.
- Fleet forecasting tools that accounts for policy interactions and integrate with strategic transportation models.
- Benchmarking direct GHG cost effectiveness based on evaluations.

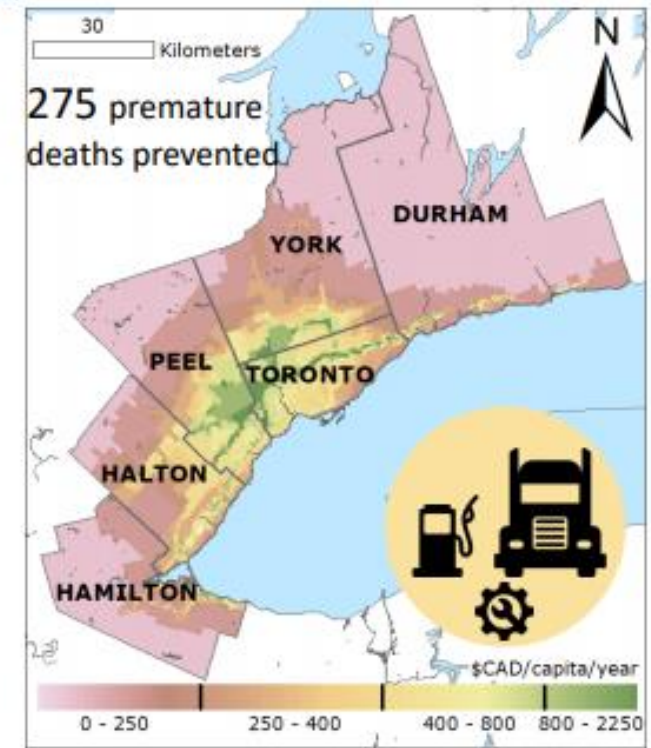
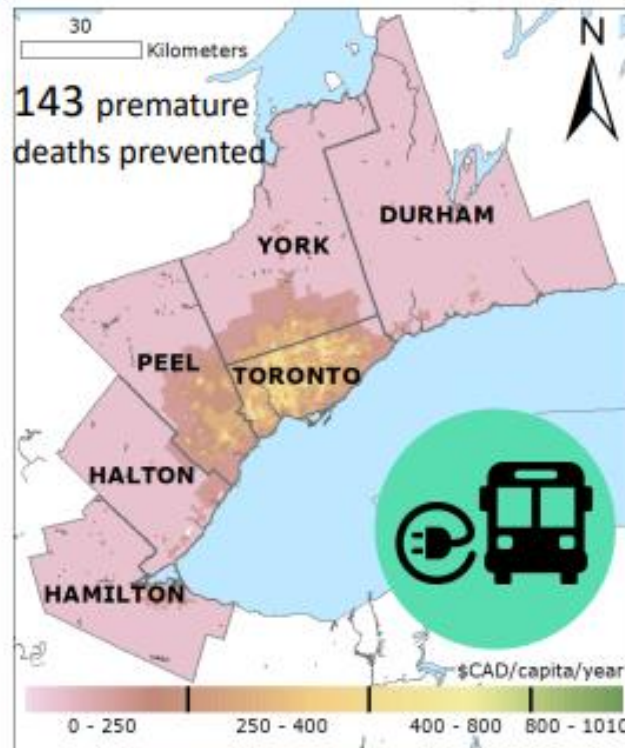
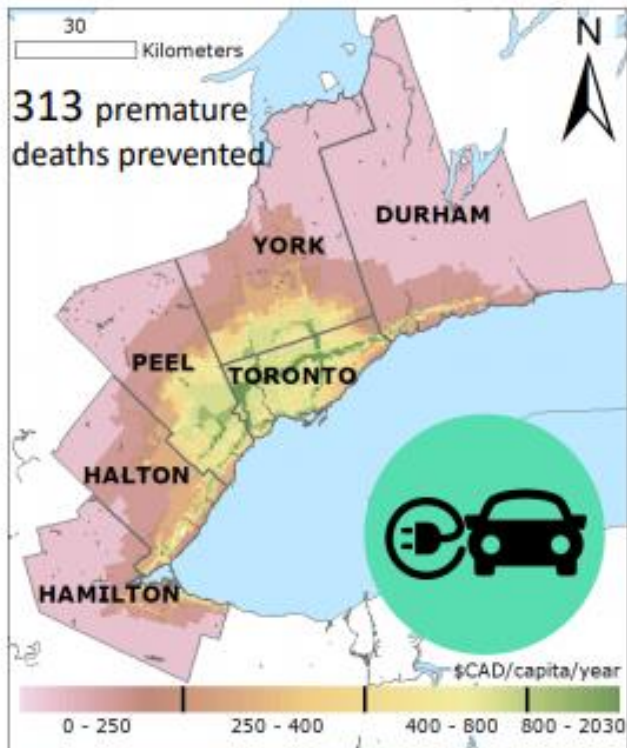
[Williams \(2021\)](#)

# Workshop Highlight: Electrification of Fleet and Rideshare Vehicles

- Workshop considered three primary research areas/questions:
  - 1. Energy and emissions**
    - Panelists; Rocky Mountain Institute, Ellis & Associates, Uber, Forth, Green Light Labs
    - Topics: lifecycle emissions of BEVs, EV performance throughout drive cycle, regional differences
  - 2. Design requirements**
    - Panelists: NREL, Marain, EVgo, Kia Motors, Cruise
    - Topics: battery rightsizing, charging network construction and access, incentives for EV purchases
  - 3. Grid Interactions**
    - Panelists: Cadeo, EPRI, Energy Ventures, DKS, Electrification Coalition
    - Topics: grid responsiveness to charging demands, TNC load management, fleet vs. consumer charging
- Emphasized need for coordination between OEMs, electric utilities, and TNCs

# Electric Cars vs. Electric Buses vs. Cleaner Trucks

## Distribution of social benefits across the region



Transportation and Air Quality Research Group (Traq)



**UTTRI**

# Transportation Equity

- Hana Creger, Greenlining Institute, [presentation to Alt Fuels Committee](#)
  - Defined existing racial inequities and injustices in transportation
    - Gave some actionable steps for integrating equity into future projects
    - Continue to measure and verify equitable outcomes with data
  - Reached out through Equity CoP to possibly schedule a Volpe lunchtime talk
- Dorval R. Carter, Jr., Chicago Transit Authority, Thomas B. Deen Lecture
  - [“Our Work is Never Done: Examining Equity Impacts in Public Transportation”](#)
    - Discussion afterwards with former US DOT Secretary Anthony Fox on YouTube
  - Mentioned Beavercreek Title VI case and other legal rulings against discriminatory transit policies/practices

# 6 STANDARDS FOR EQUITABLE INVESTMENT

## 1. EMPHASIZE ANTI-RACIST SOLUTIONS

Undoing racist policies like redlining and highway construction requires anti-racist strategies to target and prioritize resources to communities of color – while dismantling the structures that reinforce these inequities across the transportation system.

## 2. PRIORITIZE MULTI-SECTOR APPROACHES

We must prioritize mobility approaches that provide co-benefits by addressing multiple issues and sectors at once such as outreach, engagement, capacity building, wealth-building, climate adaptation, anti-displacement, and more.

## 3. DELIVER INTENTIONAL BENEFITS

Benefits cannot trickle down to communities; they need to go directly to the people most in need in the most impactful ways, while not increasing or creating new burdens.

## 4. BUILD COMMUNITY CAPACITY

To ensure under-resourced communities are able to apply for, develop, and implement clean mobility equity programs, they must require and build in technical assistance, capacity building, and long-term training and skills development.

## 5. BE COMMUNITY-DRIVEN AT EVERY STAGE

Community-centered investment means lifting up community-led ideas and sharing decision-making power throughout every phase of a program's goal-setting, needs assessments, outreach, implementation, and evaluation.

## 6. ESTABLISH PATHS TOWARD WEALTH-BUILDING

In addition to just providing cost-savings, clean mobility programs must create jobs, workforce development and training opportunities, contract with local businesses, and grow community-owned assets and infrastructure.

# EV Purchase Incentives

## Equity Evaluation – Federal Income Tax Credit (ITC)

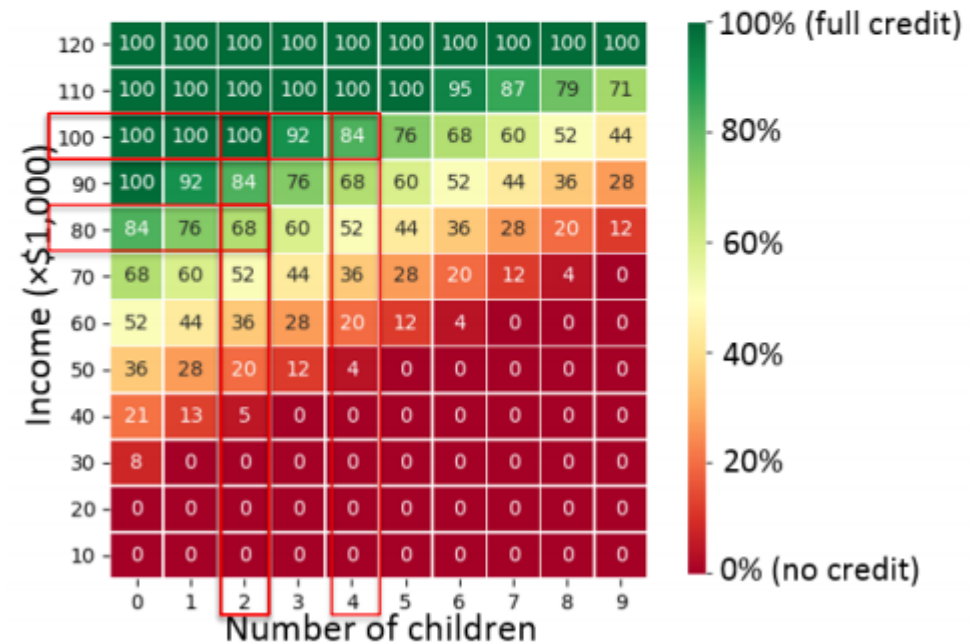
- Federal PEV Credit: up to **\$7,500 federal income tax credit (ITC)** for the purchase of a new qualified PEV
  - Only worth \$7,500 to customers **whose federal tax bill at the end of the year is \$7,500 or more**
- Significant income disparity across households in qualifying for federal PEV tax incentives

A married couple with two children whose family income is \$100,000 in 2018 qualifies for **100%** (**\$7,500**) of the federal PEV ITC

A married couple with two children whose family income is \$80,000 in 2018 qualifies for **68.5%** (**\$5,139**) of the federal PEV ITC

A married couple with four children whose family income is \$100,000 in 2018 qualifies for **84.5%** (**\$6,339**) of the federal PEV ITC

Federal PEV credit Eligibility for U.S. Married Couple

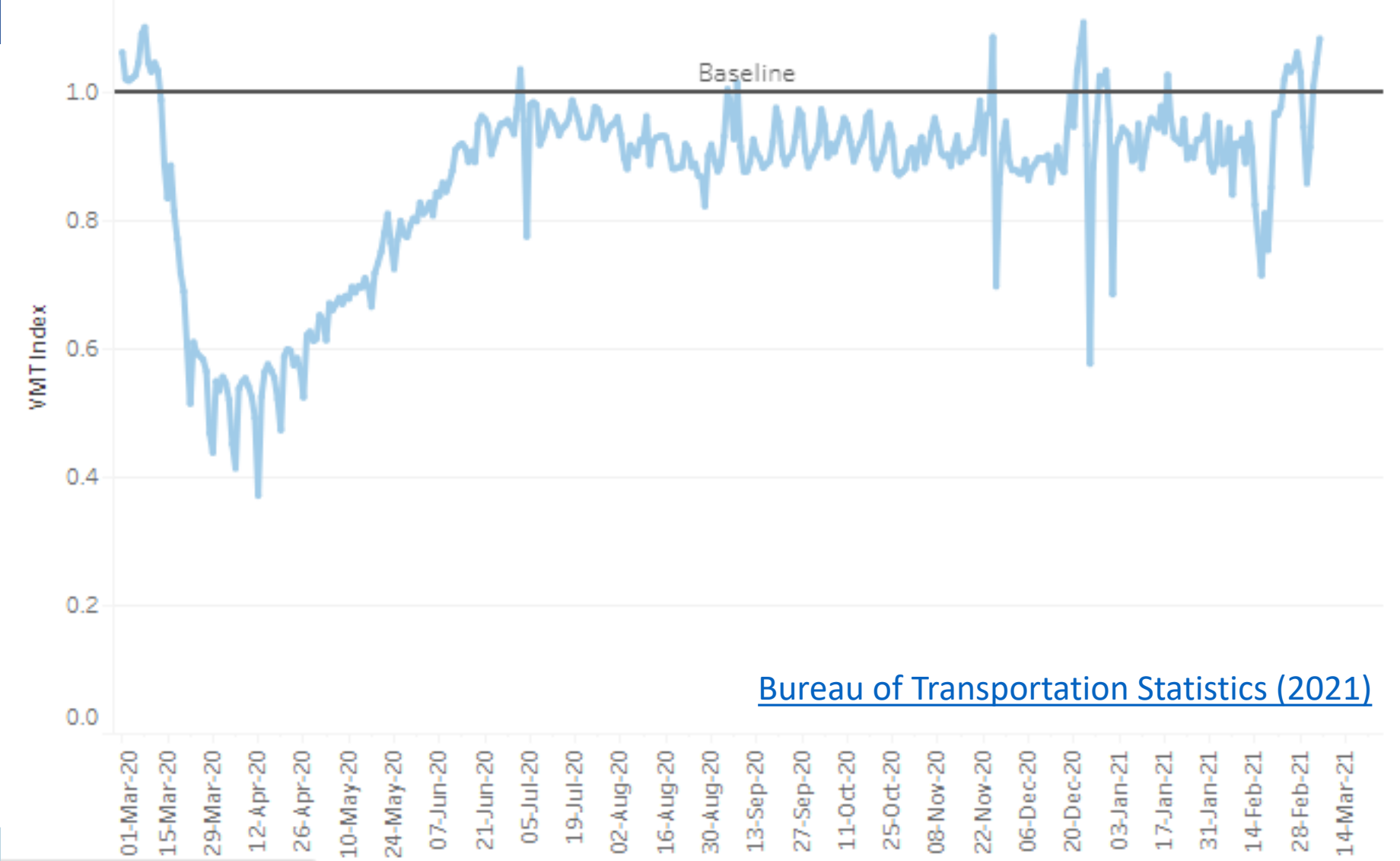


# COVID-19 and Integrated Transportation Modeling

- The COVID-19 pandemic was a vivid backdrop for TRB conference
  - Passenger vehicle trips have continued to creep up after initial lockdown
    - Less commuting while many offices have remained closed since March 2020
    - Drops in commercial flights has equated to higher passenger vehicle travel during holidays
  - Interstate highways have seen similar traffic as pre-pandemic levels
    - Increased freight traffic due to [higher e-commerce demands](#)
  - Many in disadvantaged populations are frontline workers or unequipped to telework
- Vaccine distribution requires coordinated logistics
  - Recent power outages in Texas delayed vaccine shipments



# US Vehicle Miles Traveled (March 2020-March 2021)

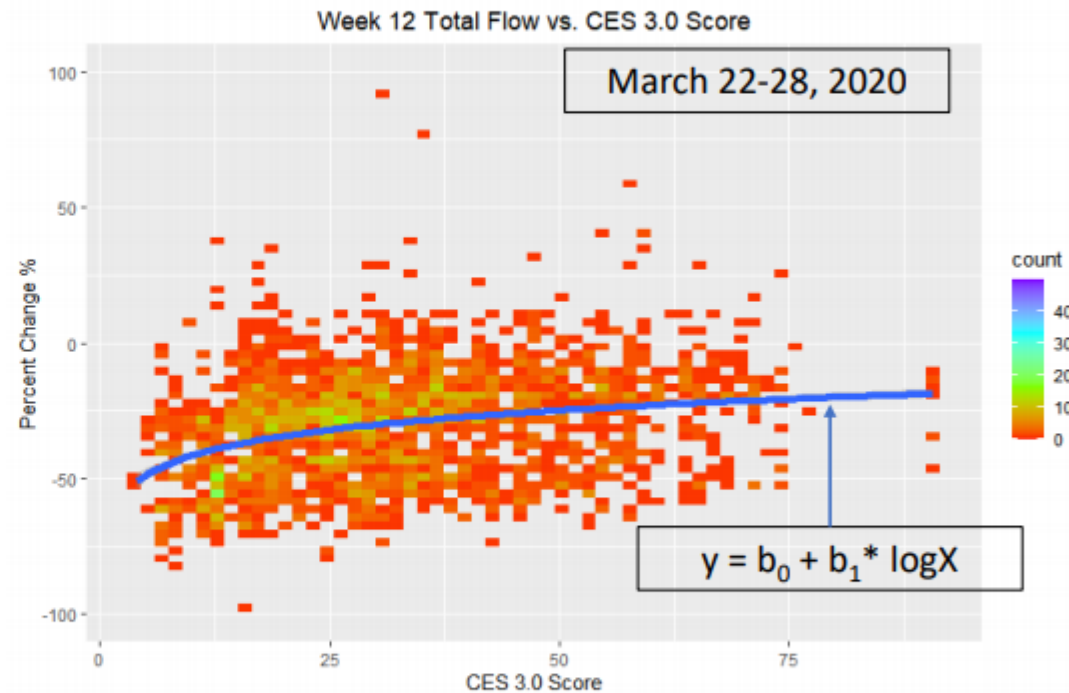


Bureau of Transportation Statistics (2021)

# Essential workers are more likely to live in low-income communities

## Environmental Justice of COVID Shutdown

- Traffic flow changed differently in different census tracts.
- *High CES Score* > More vulnerable population in terms of socio-economic and environmental exposure.
- *Low CES Score* > Less disadvantaged
- Spatial distribution of traffic flow reduction favored low CES areas



# Closing Thoughts

- Conference organizers were quite strict about starting and ending on time
- Virtual format helped create a more relaxed atmosphere
  - Impromptu discussions, speaker follow-up, and side conversations infeasible though
- Difficulty finding conference presentations and papers
  - TRB opted not to publish papers last year; only select presentations available
  - Nice to find all sessions have been recorded for later viewing
    - Recordings are available until March 18<sup>th</sup>
- Committee reorganization did foster better co-sponsorship of events