NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

TRB 2023 BLUE RIBBON COMMITTEE Presented by the Technical Activities Council

2023 Meeting Agenda: Air Quality and GHG Mitigation Committee (AMS 10)

Theme: "*Rejuvenation Out of Disruption: Envisioning a Transportation System for a Dynamic Future*."

Date: Wednesday, January 11, 2023
Time: 8:00 am to 12:00 pm (U.S. Eastern Time)
Place: Archives (M4), Marriott Marquis

- **Doug Eisinger**, Sonoma Technology and Univ. of Washington, Committee Chair
- **Marianne Hatzopoulou**, Univ. of Toronto, Vice Chair & Committee Research Coordinator
- **Greg Rowangould**, Univ. of Vermont, Paper Review Coordinator

Online Meeting Access:

- The meeting is "in-person," but it is the committee's goal to also allow access via zoom
- Note for zoom participants: **Internet connectivity may be limited or intermittent**
- Zoom link to participate: https://utoronto.zoom.us/j/7012067129
- Meeting sign-in form: https://forms.gle/EwX2MUfyGVqiXZWf7

Meeting focus: Connecting research to practice, implementation case studies, paper reviews, research priorities, 2022-2025 Triennial Strategic Plan goals

1. **Introductions, Zoom participation, AMS10 & meeting goals** (Doug Eisinger, 15 min.)
2. **Paper reviews, TRB & TRR outcomes** (Greg Rowangould, Univ. of VT & Shams Tanvir, Cal Poly SLO, 15 min.)
3. **Invited talk: 2023 Best Paper Recognition**
   - Natalia Zuniga-Garcia, Argonne National Laboratory (ANL): "Impacts of Freight Fleet Electrification in the Atlanta – Chattanooga region," paper TRBAM-23-04088 (15 min.)
4. **Research priorities: where are we at this point? Digest of 2022 summer meeting** (Annalisa Schilla, CARB) **and prior strategic planning** (M. Hatzopoulou, U. of Toronto) (15 min.)
5. **The "year" in review:** highlights of the past 12-18 months (Rick Lattanzio, CRS, 15 min.)

Break (10 minutes) [break ends at 9:25 am]

6. **Real-World Efforts Part 1 – Mid-Atlantic Electrification Case Study: Argonne National Laboratory support to advance fleet electrification and address equity** (25 minutes total)
   - Project objectives and scope (Alleyn Harned, VA Clean Cities, 5 min.)
   - Research, mapping tool, and case study analyses (Jim Kuiper, ANL, 10 min.)
   - Deployment, outcomes, potential emission benefits (Joann Zhou, ANL, 10 min.)
7. **Real-World Efforts Part 2: Fleet Electrification, EJ Communities, and Avoiding Unintended Consequences** (Regan Patterson, UCLA) (15 min.)

8. **Real-World Efforts Part 3: Panel Discussion and Breakout**
    - Panel discussion (moderator, **M. Hatzopoulou**): lessons to date, research needs (**Alleyn, Joann, Jim, Regan, 15 min.**)
    - Breakout discussion (three groups on-site, plus online breakouts):
        i. Groups meet and discuss (**25 min.**):
            1. What was most useful to you about these case study discussions?
            2. What future case studies would you like to see?
            3. What research will best connect research to practice (any topic)?

            Group Facilitators/Note Takers: Young Professionals, TRB Minority Student Fellows, FHWA Eisenhower Transportation Fellows, others TBD:

            1. Group 1
                - **Greg Barnes** (RK&K)
                - **Georges Bou-Saab** (TTI)
            2. Group 2
                - **Alexandra Brun** (FTA)
                - **Gabriella Cerna** (ASU, student)
            3. Group 3
                - **Xuan Jiang** (UC Berkeley, student)
                - **Joe Kaylor** (Arup)
            4. Online Participants
                - **Gina Yeonkyeong Park** (Cornell)

        ii. Groups report out (Zoom participants use **Google Doc link** provided in meeting) (**20 min.**)

Break (10 minutes) **[break ends at 11:15 am]**

9. **Section updates (Tim Sexton, MNDOT & Christy Gerencher, TRB) (10 min.)**
10. **Improving committee communications and outreach (Joe Schultz, ICCT, 15 min.)**
11. **Summer conference planning for 2023 (Asilomar), 2024 (Denver)** (A. Schilla, CARB) (5 min.)
12. **Volunteer recognition (D Eisinger, G. Rowangould, M. Hatzopoulou, 15 min.)**
    - 2022 Summer Meeting Summary
    - TR News #341: Sept-Oct 2022 issue on "Decarbonizing Transportation"
    - Roles and appreciation for our committee work in 2022
    - Committee recognition: 2023 Blue Ribbon Award
    - Leadership transition

Adjourn (by noon, EST)

NATIONAL ACADEMIES Sciences Engineering Medicine

Transportation Research Board

TRB 2023 Annual Meeting: *Rejuvenation Out of Disruption: Envisioning a Transportation System for a Dynamic Future*

Air Quality & GHG Mitigation Comm. (AMS10), Annual Mtg.

- **Doug Eisinger**, Sonoma Technology, Chair
- **Marianne Hatzopoulou**, U. of Toronto, Vice Chair
- **Greg Rowangould**, U. of VT, Paper Review Coord.

January 11, 2023

sign-in code

SCAN ME

Welcome, Agenda, Meeting Goals

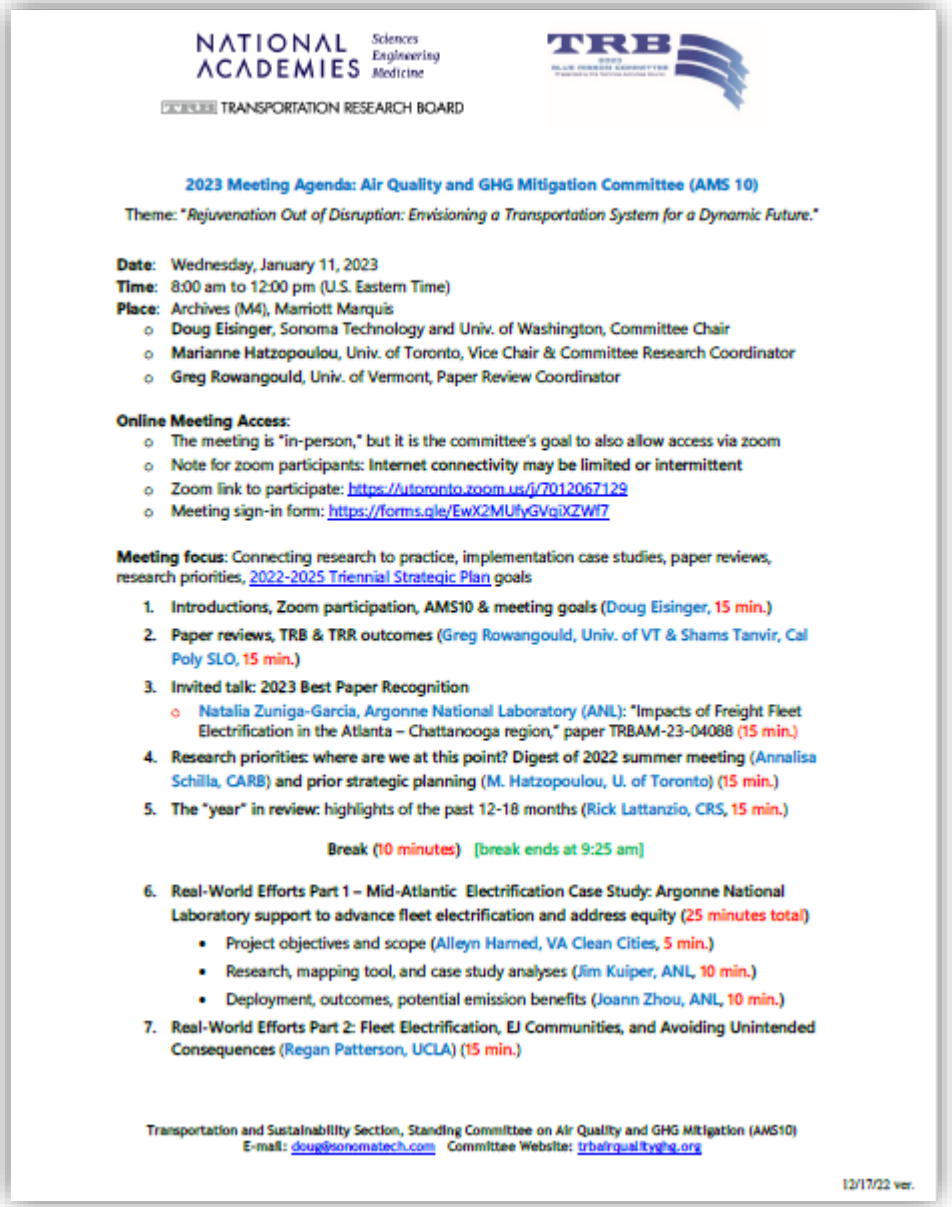
1. Introduction, AMS10 TRB events, and poll
2. Paper review process
3. Best paper: Natalia Zuniga-Garcia, ANL
4. Research priorities
5. The "Year" in Review

   10 minute break

6. **Real-world efforts (Parts 1-3 + breakout)**

   10 minute break

7. Communications and outreach
8. Summer conference plans: 2023, 2024
9. Volunteer roles and appreciations



NATIONAL ACADEMIES Sciences Engineering Medicine

TRANSPORTATION RESEARCH BOARD

TRB

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Transportation and Sustainability Section, Standing Committee on Air Quality and GHG Mitigation (AMS10)
E-mail: doug@sonomatech.com Committee Website: trbairqualityghg.org

12/17/22 ver.

Committee Mission Statement (updated 2020)

Our Mission is to provide leadership in research initiatives and knowledge sharing in the area of transportation-related air quality and GHG mitigation issues. AMS10 does this by ensuring that

- up-to-date research needs are maintained
- cross-cutting emerging issues are identified
- critical issues are addressed in sessions and events
- excellence in research is rewarded, and
- the committee remains relevant and vibrant

Core TRB 2023 Annual Meeting Activities for AMS10

Activity	Date, Day	Time (EST)
1. **Workshop**: Steering the Titanic, Decarbonizing Transp. Within Systems of Incremental Change, Convention Center (Conv. Ctr.) 146A	Jan 8, Sun	1:30 to 4:30
2. **Lectern Session** 2026: Air Quality (AQ) Modeling & Policy, Conv. Ctr. 140	Jan 9, Mon	8:00 to 9:45
3. **Poster Session** 2214: Current Issues in AQ & GHG Mitigation, Conv. Ctr. Hall A	Jan 9, Mon	3:45 to 5:30
4. Electrification & Future Mobility **Subcomm. mtg**., Marriott Marquis Chinatown (M3)	Jan 9, Mon	6:00 to 7:30 pm
5. **Lectern Session** 3135: Evaluating GHG Mitigation Potential of EVs & Climate Policies, Conv. Ctr. 140	Jan 10, Tues	1:30 to 3:15
6. Climate Change **Subcomm. mtg**. (with AMS30/40), Marriott Marquis Archives (M4)	Jan 10, Tues	6:00 to 7:30 pm
7. AQ & GHG Mitigation Comm. mtg.,	Jan	0 to 12:00
8. Environ. Justice & Goods Movemen Station (M3)	Jan	5 to 5:30

Introductory poll – let's find out who's here

Who is attending TRB for the 1st time?

What is your affiliation?

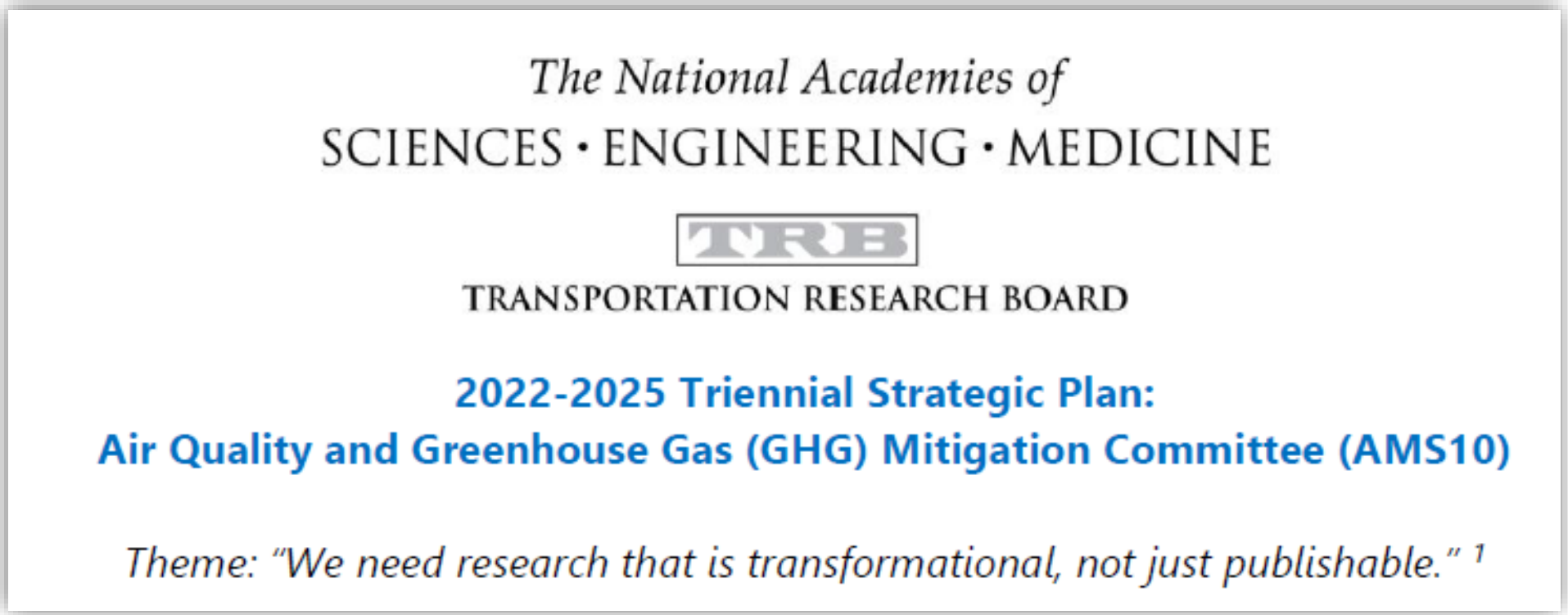
- Federal Government
- State Government
- Local government
- Academia, Consulting, other NGOs

Zoom participants:
https://utoronto.zoom.us/j/7012067129

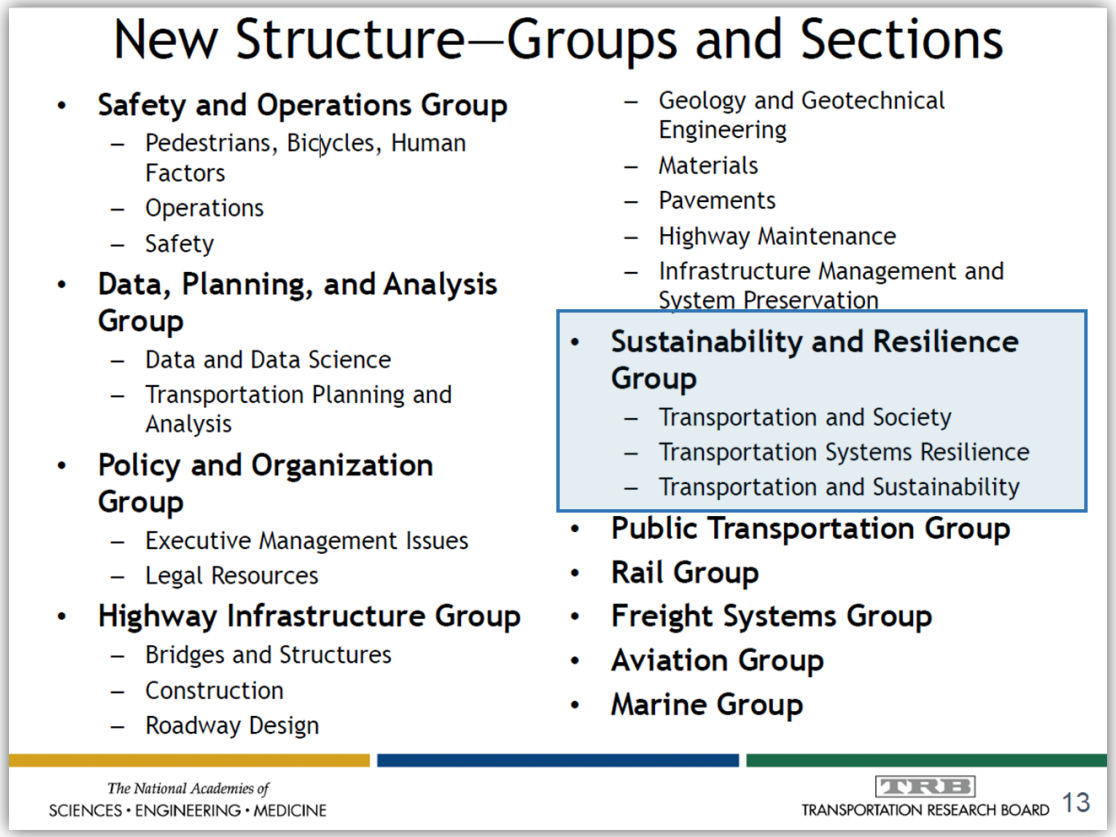
sign-in code

Introduction: Recap of Recent Actions

- TRB Reorg 2020: Expands AMS10 with GHG Mitigation
- Committee Reorg and New Strategic Plan 2022 with our Climate "*Statement of Urgency*"



Introduction: TRB Structure



Group: Sustainability & Resilience, AM000

Section: Transp. & Sustainability, AMS00

Committees:

1. **Air Quality & GHG Mitigation (AMS10)**
2. Resource Conservation & Recovery (AMS20)
3. **Transportation Energy (AMS30)**
4. **Alt. Transp. Fuels & Tech. (AMS40)**
5. Transp. & Economic Development (AMS50)

AMS10 2022-2025 Triennial Strategic Plan
Statement of Urgency (Excerpts)

The National Academies has stated, "…to reach net-zero carbon by 2050, the United States **must begin taking action now** *[emphasis added]* to accomplish five main technology goals. Meeting these objectives over the current decade (2021-2030) will be essential to making the net-zero transition possible on a 30-year timeframe, so that long-lived energy infrastructure can be replaced with zero-carbon alternatives." As noted by the National Academies, "A sharp reduction in CO_2 emissions is needed to slow climate change and avoid the most severe impacts on weather extremes, ecosystems, human health, and infrastructure." *

Given the urgent need to address climate change, and the recent focus by the National Academies and TRB on GHG mitigation, there is a short-term need to prioritize resources on GHG issues… AMS10 faces a key challenge: it must rapidly address GHGs and simultaneously maintain and improve upon its ability to address air quality. To meet this challenge, **the committee must place special emphasis in the near-term on GHG mitigation, while sustaining its ongoing air quality-related work.**

* See goals from Accelerating Decarbonization of the U.S. Energy System: (1) produce carbon-free electricity; (2) electrify energy services in transportation, buildings, and industry; (3) invest in energy efficiency and productivity; (4) plan, permit, and build critical infrastructure; (5) expand the innovation toolkit: triple investment in clean-energy R&D and demonstration.

Near-Term Goals: 2022-2025 Strategic Plan

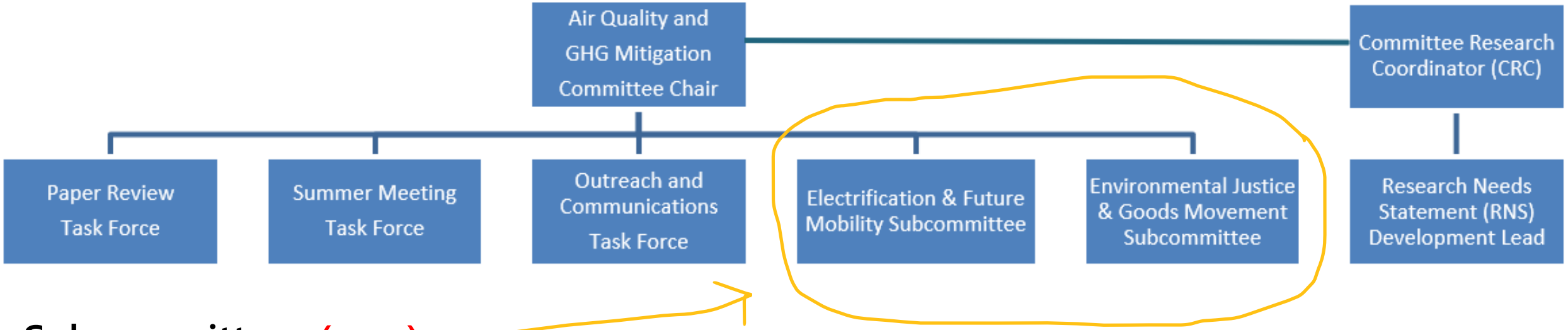
1. Connect research to policy: focus research priorities on policy-relevant actions
   a. Identify policy community needs, share science-based priorities with practitioners
   b. Develop findings to inform GHG control efforts in the near-term (two to five years)

2. Identify, assess, and profile informative GHG mitigation efforts (case studies)
   a. What was done? What obstacles were encountered? Were they overcome and how?
   b. What real-world outcomes were achieved?
   c. What are the transferrable policy development and implementation lessons?

3. Improve information sharing on GHG and air quality-related research
   a. Develop TRB e-Circulars (key topic research roadmaps – see Subcomm. Research Clusters)
   b. Improve dissemination of findings to practitioner and research-funding communities
   c. Leverage web-based communication resources
   d. Coordinate with AMS30 (Energy) and AMS40 (Alternative Fuels and Technologies)

4. Continue to improve diversification of committee participants, membership, and leadership
   a. Increase involvement by under-represented stakeholders and young professionals
   b. Address diversification through committee membership rotations
   c. Promote diversity, equity, and inclusion in research activities (e.g., paper submissions)

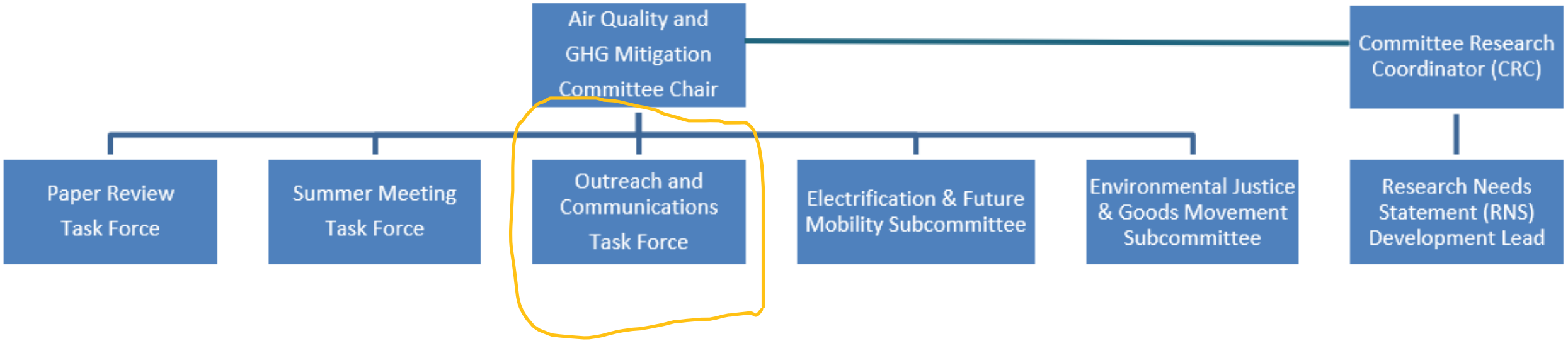
New in 2022: AMS10 Structure (1 of 2)



Subcommittees (new)

- **Electrification and Future Mobility (John Davies, Alex Bigazzi)**
  - Fleet electrification and lifecycle emissions impacts for air quality and GHG control
  - Behavior change, pricing, and future mobility: use and electrification of TNCs, CAVs, transit
- **Environmental Justice & Goods Movement (Cindy Copeland, Kanok Boriboonsomsin)**
  - Environmental justice: light, medium, and heavy-duty vehicle impacts and controls
  - Goods movement and diesel-powered vehicle air quality and GHG impacts and controls

New in 2022: AMS10 Structure (2 of 2)



Administrative Task Forces

- Paper Review
  (Greg Rowangould, Shams Tanvir)
- Summer (Mid-Year) Meeting
  (Annalisa Schilla, Ellen Greenberg)
- **Outreach & Communications**
  (new – looking for volunteers!)

Research Coordination

- Committee Research Coordinator
- Research Needs Statement Development Lead

AMS10 Paper Review Summary 2023 TRBAM

Greg Rowangould

AMS10 Paper Review Coordinator

THE UNIVERSITY OF VERMONT
TRANSPORTATION
RESEARCH CENTER

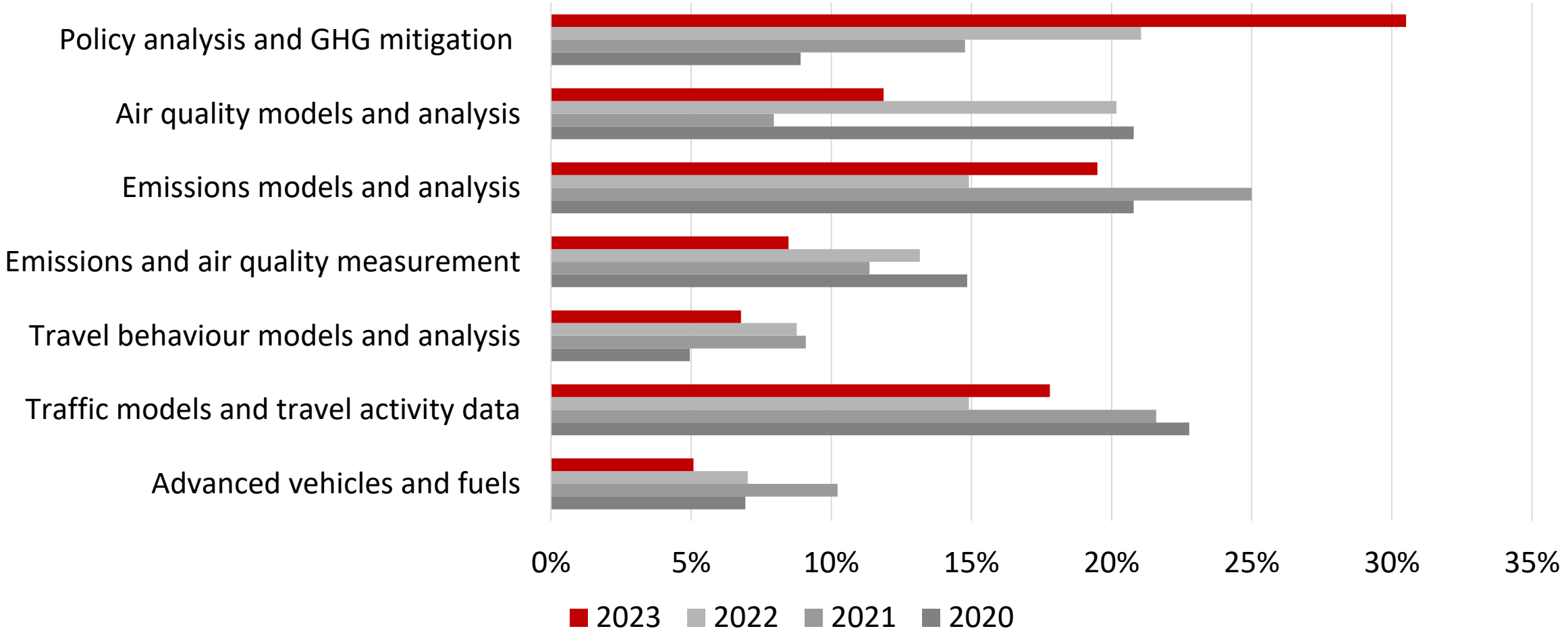
2023 Paper Review Team – Thanks!

Paper Handler	AMS10 Involvement
Haobing Liu	Member
Shams Tanvir	Member
Zhiming Gao	Member
Mohammad Miralinaghi	Friend
Weichang Yuan	Friend
Husain Aziz	Friend
Xu Xiaodan	Friend
An Wang	Friend
Scott Gilman	Friend

AMS10 Paper Submission and Review Statistics

	TRB Annual Meetings				
	2019	**2020**	**2021**	**2022**	**2023**
Papers reviewed for presentation	128	109	93	106	**121**
Papers reviewed for publication	86	56	40	54	**65**
Total reviews	383	282	262	317	**352**
Reviews/paper	3	2.6	2.8	3	**2.9**
Accepted to present	66	62	53	57	**67**
Forwarded to TRR	17	11	12	10	**4**

AMS10 Paper Topics



Looking Ahead to Next Year

- Shams will be taking over as the Paper Review Coordinator
- Please respond to our annual reviewer poll with paper review availability and interests
  - Poll is sent out in July
  - Get on the Friend's listserve if you're not and would like to review
- Interested in volunteering as a paper handler?
  - Contact Shams Tanvir: stanvir@calpoly.edu

Best Paper Recognition

Natalia Zuniga-Garcia, Argonne National Laboratory (ANL)

"Impacts of Freight Fleet Electrification in the Atlanta – Chattanooga region"

Paper: TRBAM-23-04088

TRB Annual Meeting 2023

Standing Committee on Air Quality and Greenhouse Gas Mitigation (AMS10)

Impacts of Freight Fleet Electrification in the Atlanta – Chattanooga region

Natalia Zuniga (nzuniga@anl.gov), Vincent Freyermuth, Monique Stinson, and Olcay Sahin
Argonne National Laboratory
Transportation Systems and Mobility

January 11th, 2023

Introduction

- The transportation sector is one of the **largest contributors** to US greenhouse gas (GHG) emissions.
- A significant part of these emissions come from **freight-related trips**.
  - In 2019, MD and HD vehicles accounted for **24% of the transportation sector** GHG emissions (EIA, 2022) and were responsible for **7% of the total GHG** emissions in the nation (EPA, 2021), despite accounting for only 9**% of the total VMT**.
- With truck freight transportation operations expecting an approximate **growth of 30%** between 2019 and 2040 and **50%** between 2019 and 2050 (FHWA, 2022), measures should be taken to **reduce the environmental impact of MD and HD vehicles** in the sector.

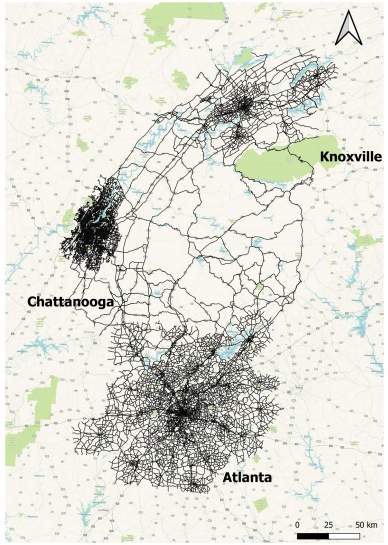
Introduction

Objective is to evaluate the impacts of electrifying regional freight in the Atlanta – Chattanooga region.

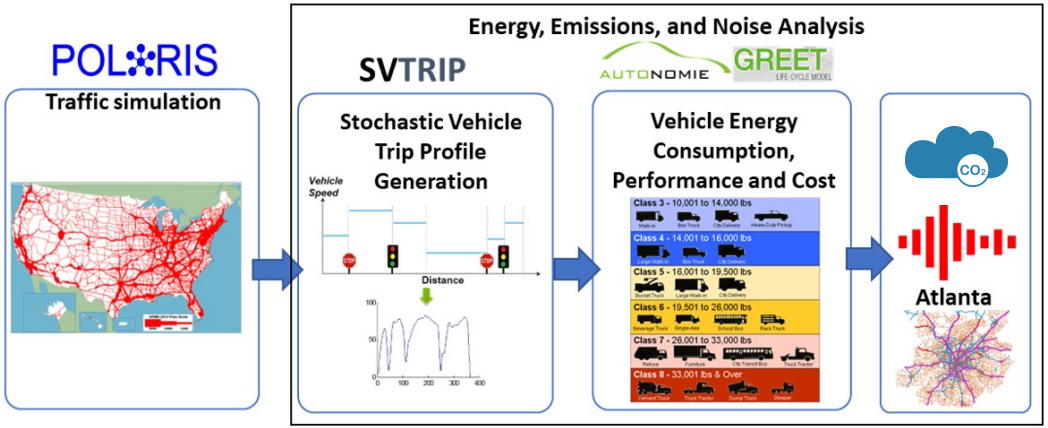
- A set of tools and different data sources are combined to provide realistic freight demand and simulated duty cycles for the entire area:
  1. A novel methodology is developed and applied to convert truck trips into **truck tours**.
  2. The freight tours and passenger tours are then modeled using **transportation system simulation** for the entire network.
  3. The route information is used to generate **speed profiles** for each trip.
  4. The **energy consumption** for each vehicle in the simulation is determined by studying trips occurring in the region.

Methodology

- **Traffic Simulation:**
  - POLARIS, an agent-based activity-based framework that can simulate travel demand at scale by creating region-specific activity and travel chains for a target synthetic population.
- **Trip Profile Generation:**
  - Stochastic vehicle trip profile (SVTrip) used to generate naturalistic speed profile.
- **Vehicle Energy and Emission**:
  - Autonomie predicts the energy consumption of the transportation network for different vehicle technologies focusing on detailed vehicle-level simulation.



- **Atlanta-Chattanooga-Knoxville:**
  - 6.7 million residents
  - 7,820 traffic analysis zones (TAZs)
  - The network is comprised of about 85,700 links and 71,425 nodes



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Vehicle Technology Scenario Definition

- ST– years 2025 to 2035
- MT– years 2035 to 2045
- LT– years 2045 to 2050

❑ **Low technology**: evolution of technology assuming limited investment in R&D or BAU.

❑ **High technology:** evolution where significant investment has led to significant technology improvements, meeting the USDOE Vehicle Technology Office targets.

Vehicle Technology Definition

Scenarios	Baseline			Short-term						Medium-term						Long-term					
				Low			High			Low			High			Low			High		
Vehicles	**LD**	**MD**	**HD**	**LD**	**MD**	**HD**	**LD**	**MD**	**HD**	**LD**	**MD**	**HD**	**LD**	**MD**	**HD**	**LD**	**MD**	**HD**	**LD**	**MD**	**HD**
Powertrain Distribution																					
ICE	98%	100%	100%	82%	89%	100%	58%	72%	87%	62%	68%	100%	33%	45%	76%	40%	39%	97%	2%	26%	52%
ISG	2%	0%	0%	10%	7%	0%	18%	18%	12%	20%	18%	0%	14%	28%	15%	30%	23%	3%	8%	27%	25%
HEV	0%	0%	0%	4%	4%	0%	13%	7%	0%	10%	7%	0%	18%	15%	0%	8%	24%	0%	21%	22%	0%
PHEV	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	7%	0%	0%	0%	0%	0%	13%	0%	0%
BEV	0%	0%	0%	4%	1%	0%	11%	4%	1%	9%	7%	0%	29%	12%	6%	23%	15%	0%	57%	26%	7%
FCV	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	16%
Automation Distribution																					
L0	100%	100%	100%	95%	94%	100%	80%	88%	93%	85%	85%	100%	50%	65%	69%	57%	69%	98%	10%	43%	34%
L3	0%	0%	0%	5%	6%	0%	20%	13%	7%	15%	15%	0%	45%	30%	29%	41%	31%	2%	72%	50%	57%
L5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	6%	2%	2%	0%	0%	18%	8%	9%
Vintage Distribution																					
0-5 years	31%	31%	30%	32%	33%	30%	32%	33%	30%	32%	33%	30%	32%	33%	31%	33%	33%	30%	31%	31%	33%
6-10 years	34%	33%	30%	34%	32%	30%	33%	33%	30%	33%	34%	30%	33%	33%	31%	33%	32%	30%	34%	34%	33%
10+ years	34%	37%	40%	34%	35%	40%	35%	35%	40%	35%	34%	40%	35%	35%	38%	34%	35%	40%	34%	35%	34%

Vehicles: LD = light duty, MD = medium duty, HD = heavy duty.

Automation: L0 = level 0 (no automation), L3 = level 3 (conditional automation), L5 = level 5 (full automation).

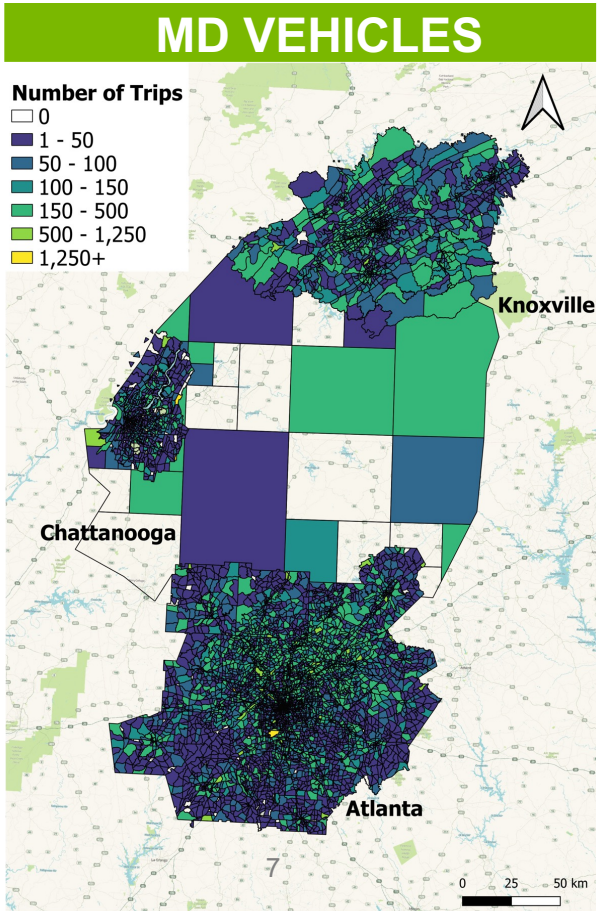
Powertrains: ICE = internal combustion engine, ISG = integrated starter generator, HEV = power-split hybrid electric vehicles, PHEV = plug-in hybrids electric vehicles, BEV = battery electric vehicles, FCV = fuel cell vehicles.

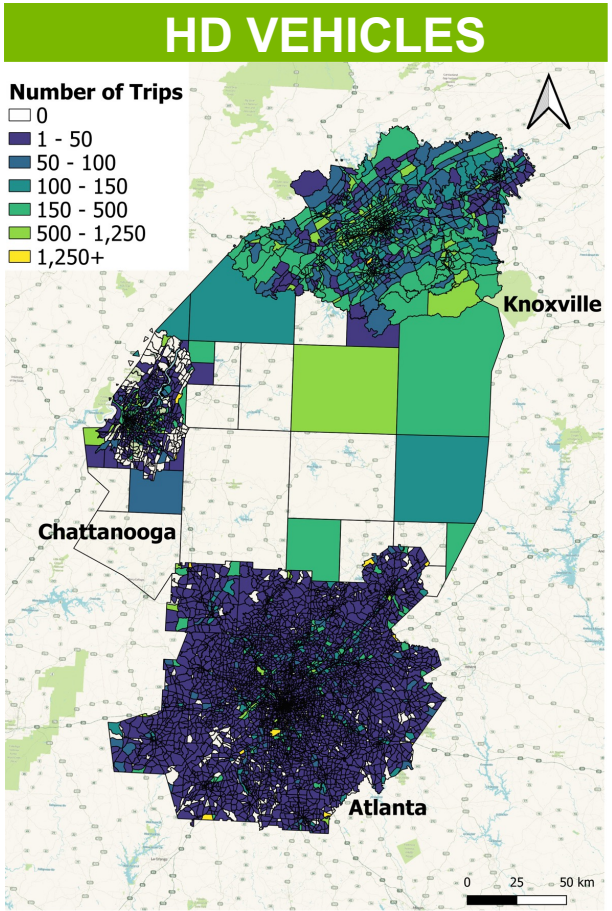
FREIGHT DEMAND AND TOUR CHAINING

Argonne NATIONAL LABORATORY

Freight Demand

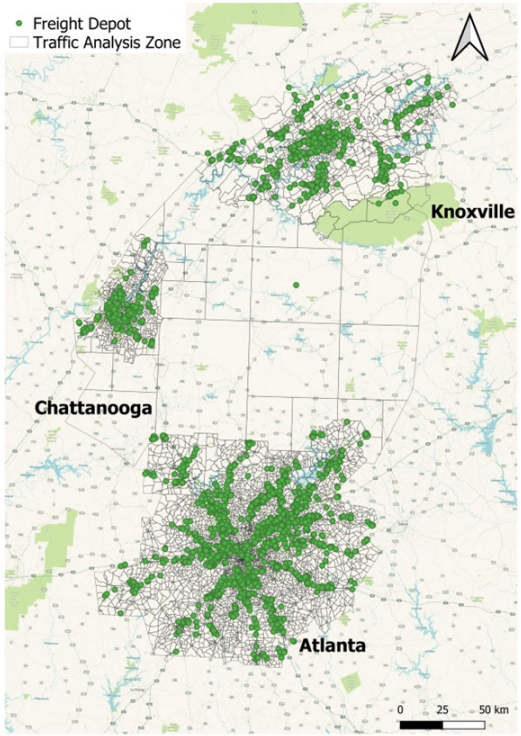
- Trip demand from Atlanta Regional Commission (ARC)'s Activity-Based Model data.
- Summarized as OD at TAZ level.
- Approximately 520k MD and 418k HD trips in the daily trip table.
- To account only for freight-related trips, a random sample of 60% MD trips was selected, while all HD trips were considered as freight.





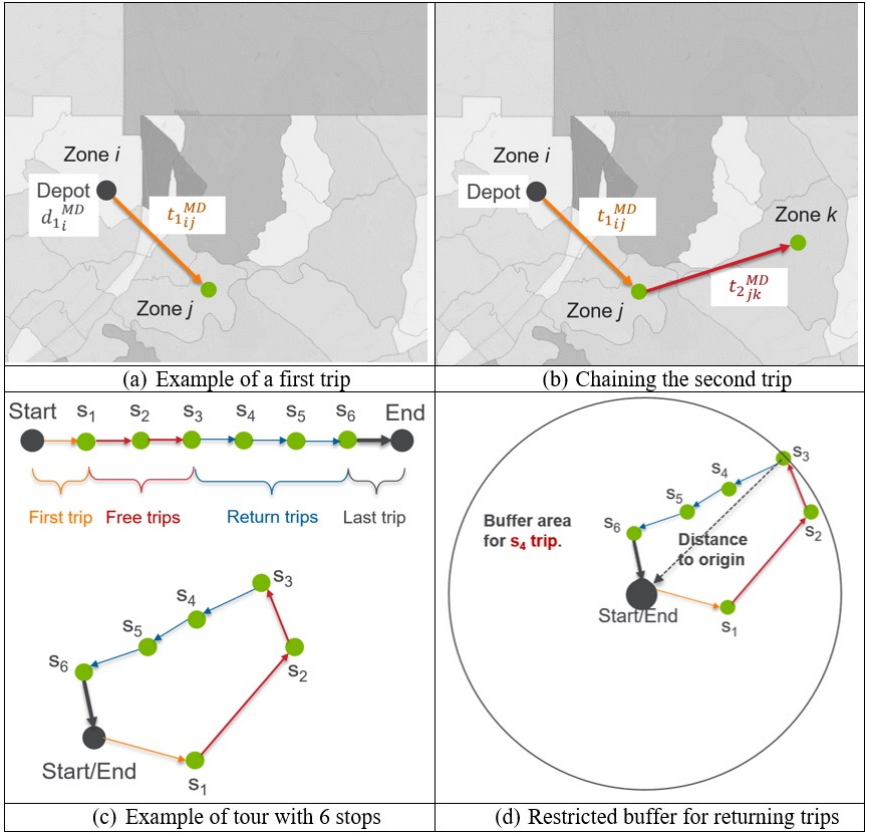
Fright Tours

- **Depots** are estimated using the approximate number of businesses in the region and were distributed across zones with more than 1% of industrial use.
- **Fleet by depot**: 32% of the trucks are in fleets of 15 or less, and 68% of trucks are in fleets of 15 or more (BTS).
- **VMT**: MD trucks cover a daily VMT of ~48 miles, and HD cover ~96 miles (VIUS) for operations withing 200 miles.
- **Number of stops**: obtained stochastically based on a combination of daily VMT and approximate trip length.



Location of freight depots

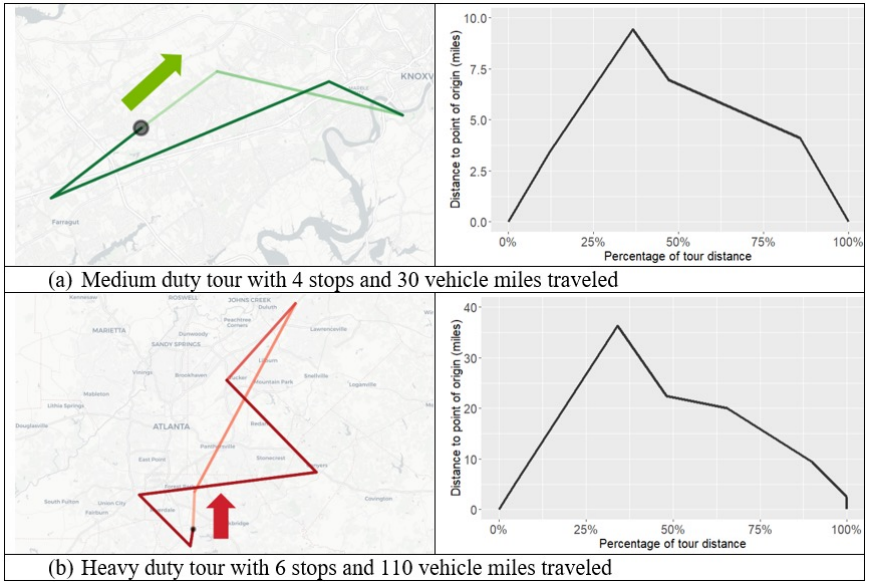
Tour Chaining



(a) Example of a first trip | (b) Chaining the second trip

(c) Example of tour with 6 stops | (d) Restricted buffer for returning trips

Tour chaining process



(a) Medium duty tour with 4 stops and 30 vehicle miles traveled

(b) Heavy duty tour with 6 stops and 110 vehicle miles traveled

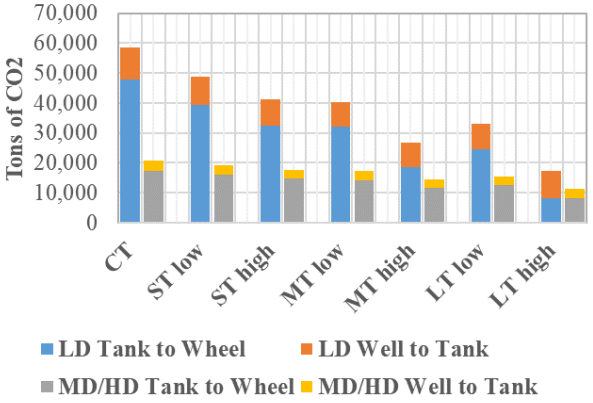
Examples of freight tours

ELECTRIFICATION IMPACT

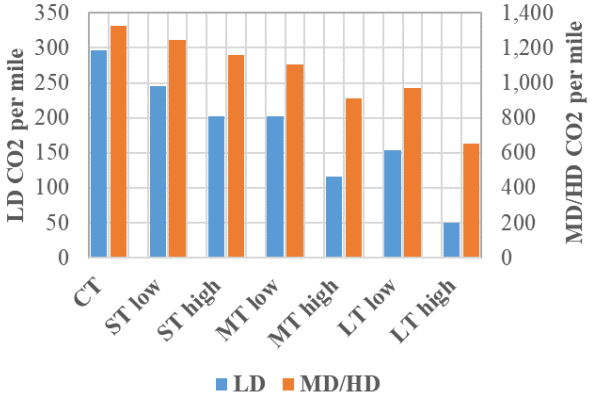
Emissions Analysis

- As the fleet gets electrified and vehicle technology improves, the **CO2 emissions are reduced**.
- **Ratio between the tank-to-wheel and well-to-tank** emissions decreases from 4.4 (LD) and 4.9 (trucks) in the base scenario to 0.9 (-80%) and 2.6 (-50%) in the LT (high technology) → BEV no tank-to-wheel

- It is expected that the LD vehicles emissions are **reduced** by a **factor of 6** for LT (high) compared to the base case, while this reduction is only by a **factor of 2** for truck vehicles.
- The use of **higher truck technology** causes that the emissions are reduced **40% more** (LT scenario), while for LD vehicles this reduction is **65% higher** than the low technology scenario.



(a) Greenhouse gases by vehicle type

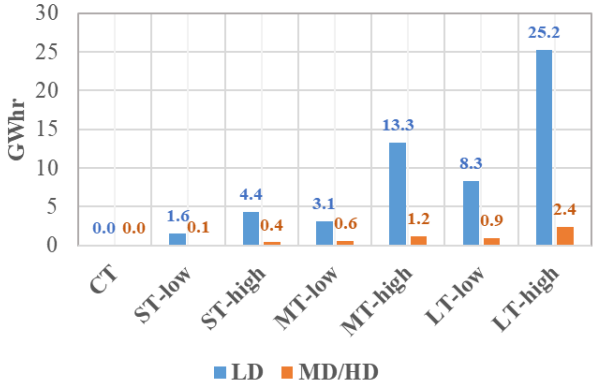


(b) Greenhouse gases per mile

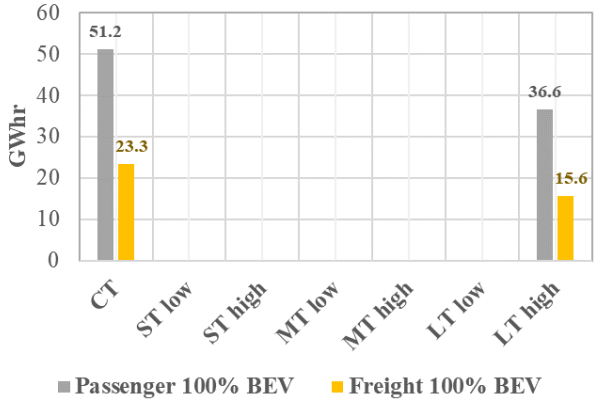
Electricity Demand

- LD vehicles far **exceeds** that of MD/HD vehicles because the electrification adoption is assumed to be higher, and the LD fleet is larger.
- The LT-high scenario shows a requirement of 25.2 GWhr for LD vehicles and only 2.4 GWhr (**~10%**) for trucks.
- In the MT-high, the **demand is half** of that with a similar (10%) proportion for trucks.

- **Vehicle technology** is an important factor in effective decarbonization efforts since it can help reduce the electricity demand by ~30%.



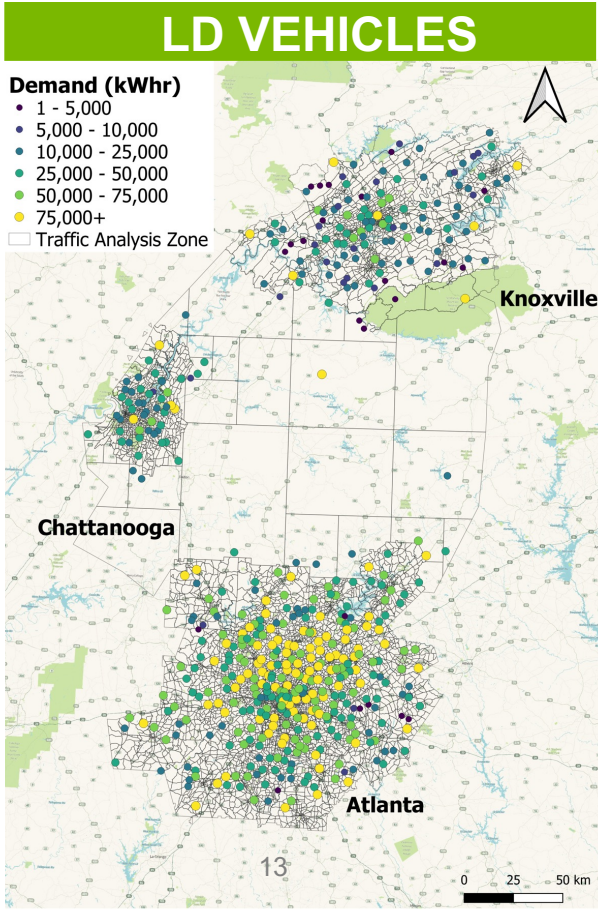
(a) Demand by different penetration rates

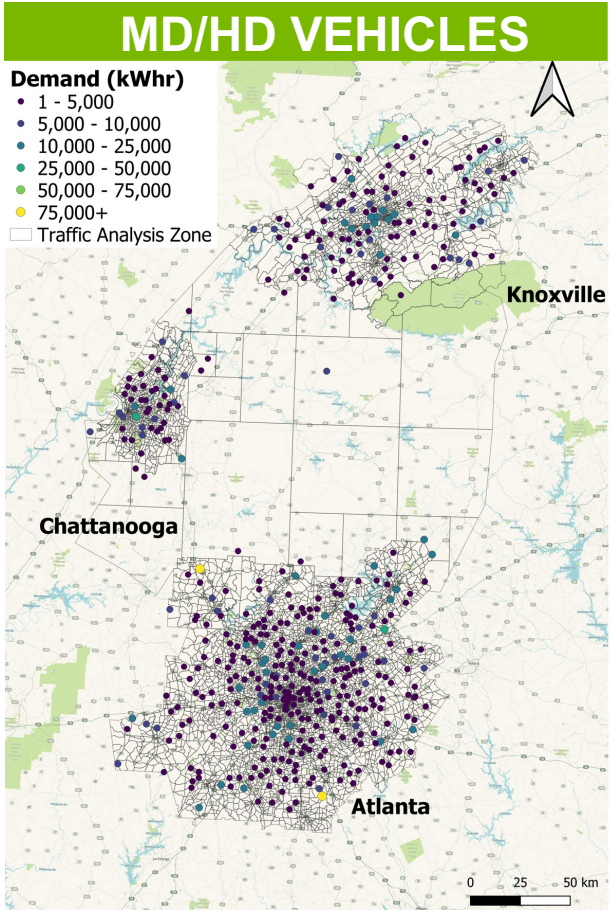


(b) Demand for the extreme cases

Electric Grid Impact

- LD vehicles charge at their place of **trip origin** and trucks charge at the **depot**.
- LD Vehicles
  - significant number of nodes with a demand of 50,000 kWhr (**45%+** of the current node's average demand of 113,000 kWhr)
- MD/HD Vehicles
  - more **centralized** as it depends on the depot location





SUMMARY & CONCLUSIONS

Summary & Conclusions

- Passenger or LD vehicles have a significantly **higher demand** due to **higher adoption and larger fleet**, with trucks representing a 10% of passengers' vehicles demand.
- Results also highlight the **role of vehicle technology** in reducing the electricity demand, nearly **30% lesser demand** is required with high technology.
- **Grid improvements are required** since a significant number of nodes will receive an additional demand of more than 45% of the current base demand.
- The truck fleet electrification efforts would not significantly affect the grid, but its adoption rates, **along with passenger vehicle** electrification, would cause issues.
- Grid improvements are **required** on a long-term basis.

THANK YOU

nzuniga@anl.gov

https://vms.es.anl.gov/tools/polaris/

Argonne NATIONAL LABORATORY

NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

AMS10 Summer 2022 Meeting Digest

Summer 2022 Meeting Objectives

1. Increase familiarity with AMS10 new structure and 2022-2025 Triennial Strategic Plan

2. Identify actions – both for the committee as a whole and that individual members can take – to operationalize the strategic plan, especially tackling the statement of urgency and near-term goals

2022 Summer Meeting Outcomes

Goal / Subgoal	What can the Committee do to operationalize these goals?
Goal 1. Connect research to policy: focus research priorities on policy-relevant actions	• Pick policy-relevant papers to share at TRB Annual Meeting and conferences • Advocate/promote poster sessions where more technical info can be shared • Sponsor and participate in workshops and seminars designed to bring communities, CBOs, researchers, policy makers together • Invite "lived experts" to our meetings (e.g., from EJ communities)
Subgoal a. Identify policy community needs, share science-based priorities with practitioners	• Define community or design a way to identify community needs. • Identify, summarize, compare frameworks for outreach and engagement with communities - how are community priorities assessed?
Subgoal b. Develop findings to inform GHG control efforts in the near-term (two to five years)	• Develop information on strategies to specifically high-mileage drivers, considering equity implications, and benefits/cost-effectiveness vs. general strategies • Develop/update information on GHG mitigation strategy effectiveness, cost-effectiveness, and co-benefits • Develop consensus on how to include/consider related sectors such as land use and electricity when evaluating transportation emissions forecasts, targets, and strategies • Suggest FHWA fund task to provide updated information on GHG cost-effectiveness

2022 Summer Meeting Outcomes

Goal / Subgoal	What can the Committee do to operationalize these goals?
Goal 2. Identify, assess, and profile informative GHG mitigation efforts (case studies)	• Profile successes and lessons learned from EVSE deployment - NEVI, MHDV programs, etc. • Survey our members and have them identify pilot programs • Focus on multimodal strategies to reduce VMT and address equity is key
Subgoal a. Understand: What was done? What obstacles were encountered? Were they overcome and how?	• Champion new NCHRP Synthesis project(s) to compile this information
Subgoal b. Understand what real-world outcomes were achieved	• Champion new NCHRP Synthesis project(s) to compile this information including synthesis of GHG policies (AMS 10 to write statement)
Subgoal c. Identify transferrable policy development and implementation lessons	• Need to identify scalable projects; important to figure out what can be moved from local to state/national context

Visit our committee's website:
https://www.trbairqualityghg.org/

Contact me:

annalisa.schilla@arb.ca.gov

Congressional Research Service

TRANSPORTATION, AIR POLLUTION, AND CLIMATE CHANGE: A YEAR IN REVIEW

Rick Lattanzio
Environmental Policy Specialist, Congressional Research Service

January 11, 2023

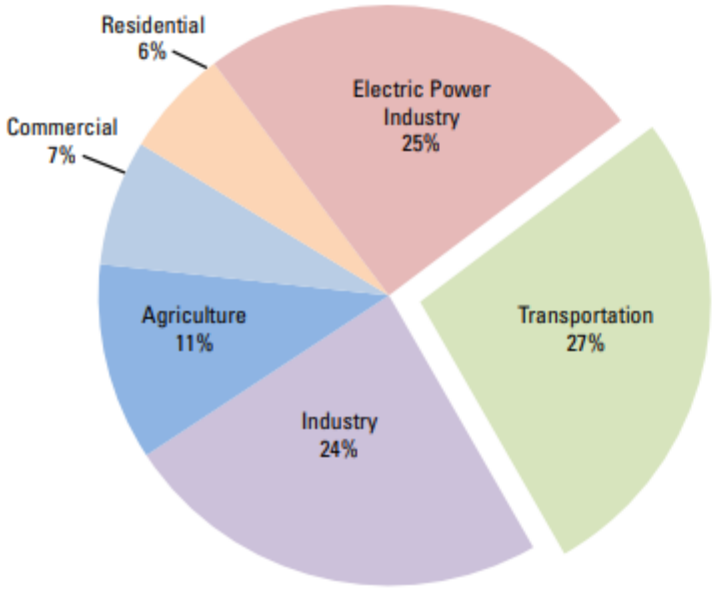
this presentation was prepared for:

The Transportation Research Board
Committee on Air Quality and Greenhouse Gas Mitigation
2023 Annual Meeting, January 8-12, Washington, DC

Agenda

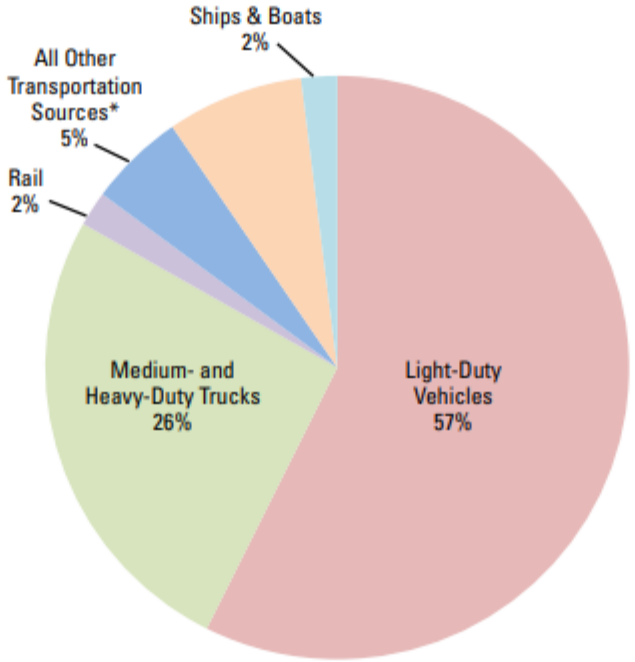
- Emissions and Industry Data
- U.S. Administrative Activity
- U.S. Congressional Activity
- Issues and Challenges
- News from Europe
- News from Asia

U.S. GHG Emissions (Sector, Source, Gas), 2020



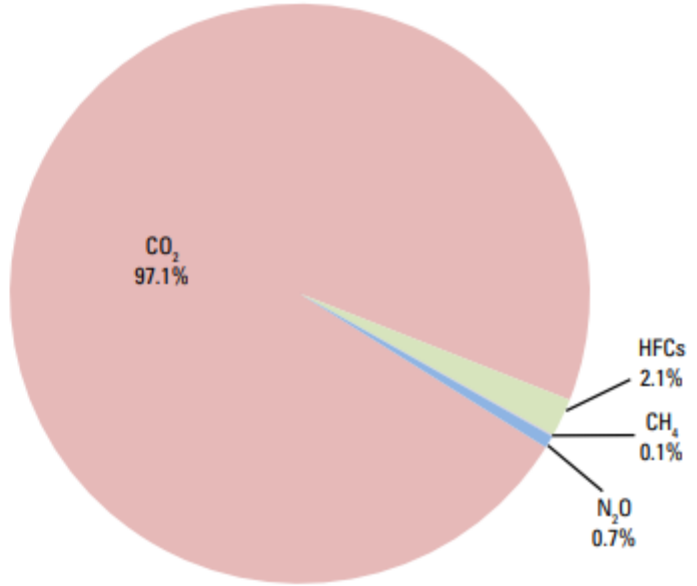
Share of U.S. GHG Emissions by Economic Sector, 2020[3,4]

Note: Totals may not add to 100% due to rounding.



Share of U.S. Transportation Sector GHG Emissions by Source, 2020[4,5]

Note: Totals may not add to 100% due to rounding.

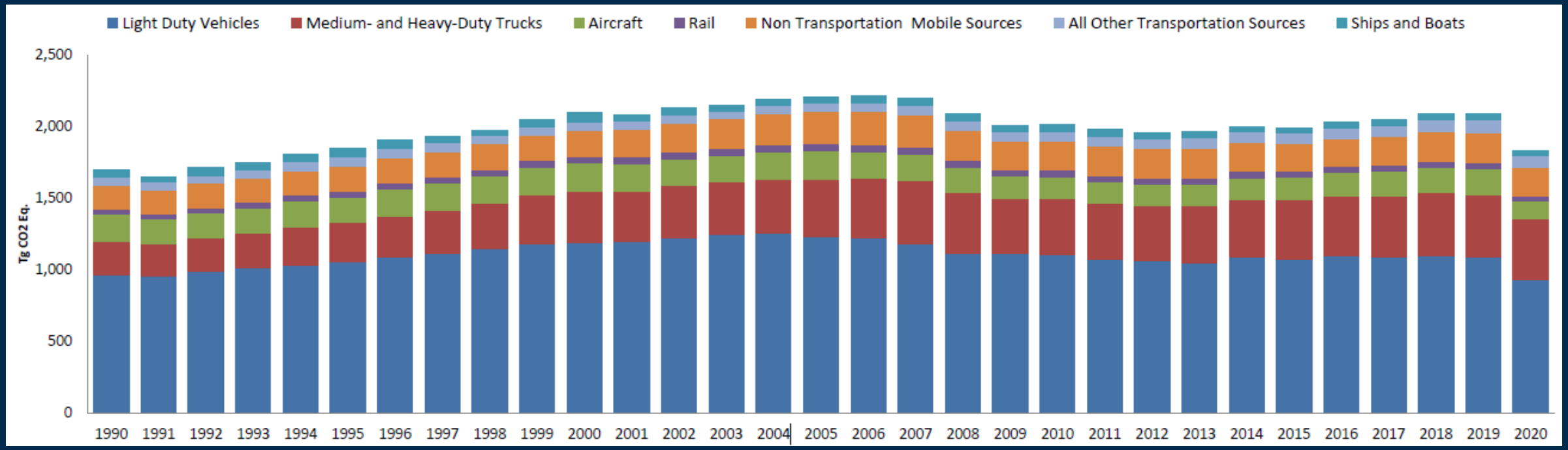


Share of U.S. Transportation Sector GHG Emissions by Gas, 2020[4]

Note: Totals may not add to 100% due to rounding.

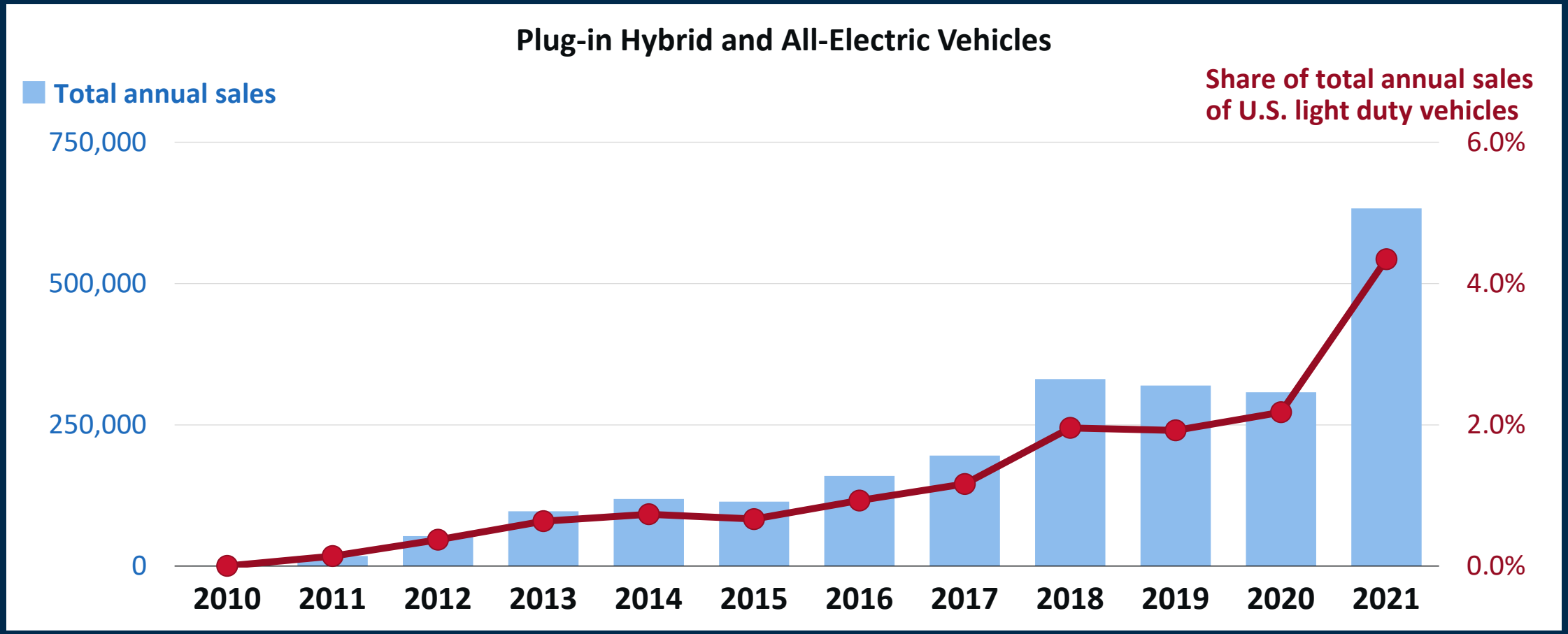
Notes: CO_2 is carbon dioxide; HFCs is hydrofluorocarbons; CH_4 is methane; and N_2O is nitrous oxide; the "By Source" figure is missing the label for "Aircraft 8%"
Source: EPA, *U.S. Transportation Sector Greenhouse Gas Emissions, 1990-2020,* May 2022, https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

U.S. Greenhouse Gas (GHG) Emissions, Transportation Sector



Notes: TgCO2Eq is teragrams, or million metric tons (MMT), of carbon dioxide equivalent
Source: EPA, *U.S. Transportation Sector Greenhouse Gas Emissions, 1990-2020,* May 2022, https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions

Electric Vehicle Sales in the United States



Source: Prepared by CRS; data from "Hybrid and Electric Vehicle Sales" – Compiled by the Transportation Research Center, Argonne National Laboratory, 2022, https://www.anl.gov/esia/light-duty-electric-drive-vehicles-monthly-sales-updates

U.S. Administrative Activity

Executive Order 14037 of August 5, 2021

- "Strengthening American Leadership in Clean Cars and Trucks"
- Setting a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles.
- Agency rulemakings to be finalized before July 2024
  - Environmental Protection Agency (EPA)
  - National Highway Traffic Safety Administration (NHTSA)

U.S. Administrative Activity

Bob Korn / Shutterstock.com

Agency Rulemakings

- EPA light-duty vehicle revised GHG standards Model Year (MY) 2023-2026 (Final Rule: 86 FR 74434, 12/30/2021)
- NHTSA light-duty vehicle revised fuel economy standards MY2024-2026 (Final Rule: 87 FR 25710, 5/2/2022)
- EPA heavy-duty vehicle multi-pollutant standards MY2027+ (Final Rule: PrePub, 12/20/2022)
- Light-, medium-, and certain heavy-duty vehicles multi-pollutant and fuel economy standards for MY2027+
- Medium- and heavy-duty vehicles GHG and fuel efficiency standards for MY2027+

California Administrative Activity

Executive Order N-79-20

- Zero Emission Passenger Vehicles by 2035
- Advanced Clean Cars II regulations
  - Low-emission vehicle (LEV)
  - Zero emission vehicle (ZEV)
- Heavy-Duty Omnibus regulation
- Advanced Clean Trucks regulation
- 17 Clean Air Act Section 177 states

U.S. Congressional Activity

Infrastructure Investment and Jobs Act (P.L. 117-58)

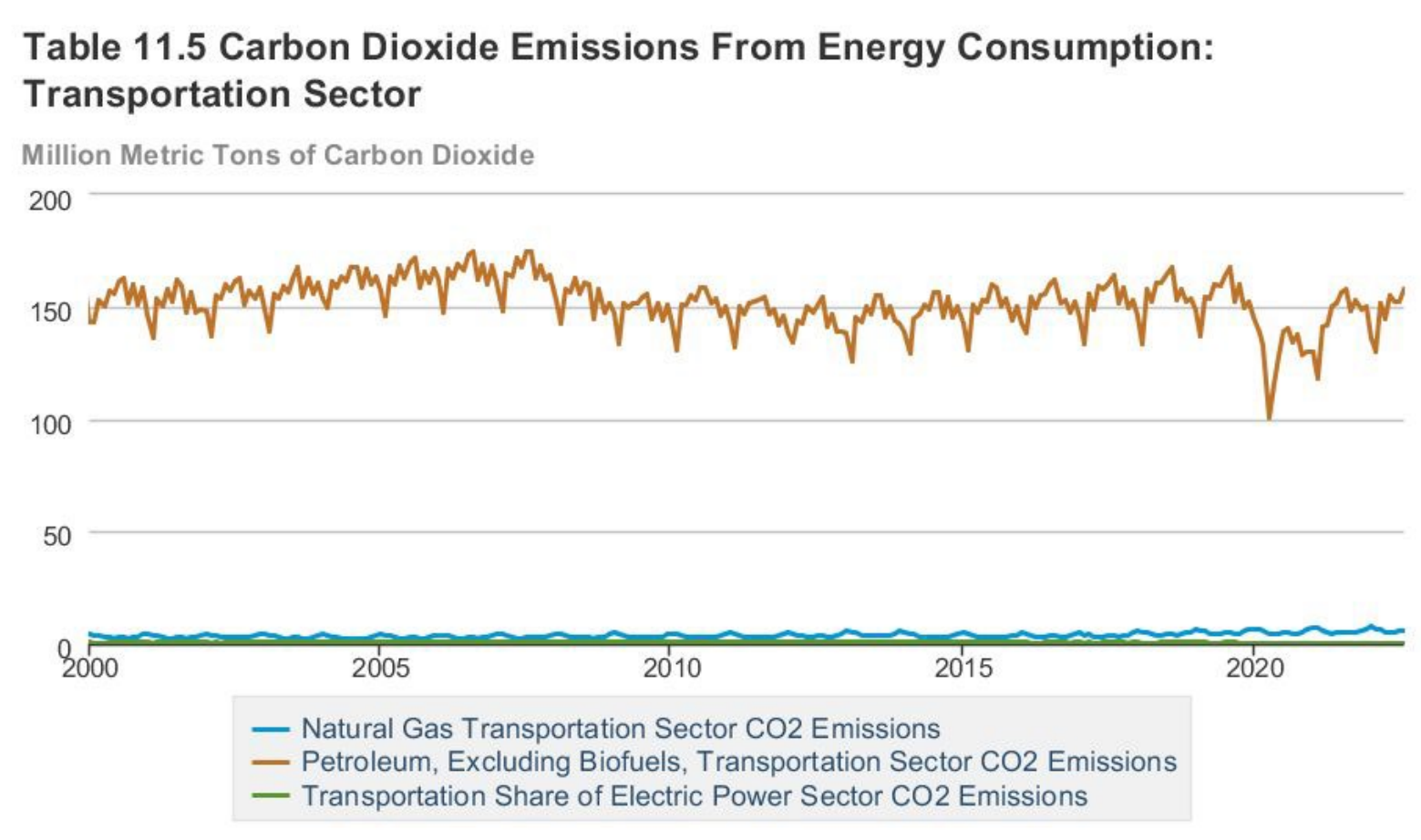
- Authorizes $973 billion between FY2022 and FY2026, including $550 billion in new federal money
- Directs over half of its investments toward improving and modernizing transportation infrastructure
- Public Transit: $39.2 billion
- Clean School Buses & Ferries: $7.5 billion
- Electric Vehicle Charging: $7.5 billion, among others

U.S. Congressional Activity

Budget Reconciliation often referred to as the Inflation Reduction Act of 2022 (P.L. 117-169)

- Authorizes $369 billion investment in clean energy and climate initiatives across all sectors
- An extension of existing tax credits for alternative fuels
- An extension of the light-duty zero-emission vehicle credits
- A new tax credit for zero-emission commercial vehicles
- A new tax credit for sustainable aviation fuels
- A new production tax credit (PTC) for U.S. battery manufacturing
- Additional funding for the EPA and other federal agencies for clean transportation programs (trucks, ports, state ZEV adoption)
- Funding for the United States Postal Service to transition its fleet to zero-emission vehicles

Issues: U.S. CO_2 Emissions by Transportation Fuel, 2000-2022



Impacts of the COVID-19 pandemic on emissions

Compared to 2019 levels:

2020 = -15%
2021 = -6%
2022* = -4%

*9 month comparison

Source: EIA, *Monthly Energy Review, Total Energy,* https://www.eia.gov/totalenergy/data/browser/index.php

Issues: Federal Standards

EPA 2022 Automotive Trends Report findings

- MY2021 to MY2022
  - no change in average fleet real world fuel economy
- 0.5% average annual increase over past five years

Court Cases

- *State of Texas, et al. v. EPA, et al.*, (22-1031)
  - major question doctrine
- *Natural Resources Defense Council v. NHTSA, et al.*, (22-1080)
  - statutory limitations on use of dedicated vehicles

Issues: California Standards

Clean Air Act waiver status

- Pending: EPA Initial Notice of California's Advanced Clean Trucks (87 FR 35768, 6/13/2022)
- Pending: EPA Initial Notice of California's Heavy-Duty Omnibus (87 FR 35765, 6/13/2022).

Court Cases

- *State of Ohio et al. v. EPA* (22-1081)
  - major question doctrine
- *Two Hundred for Homeownership et al. v. CARB* (1:22-at-904)
  - due process and equal protection clause

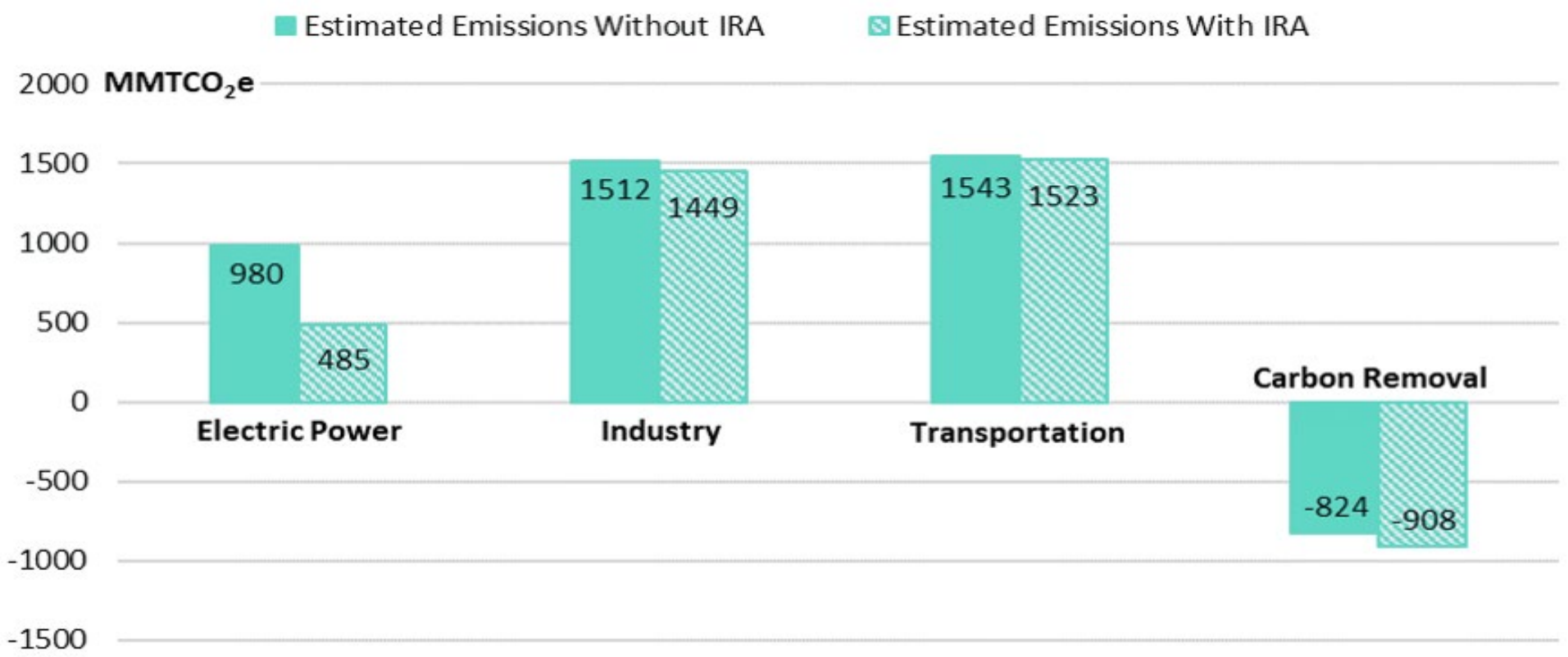
Issues: Congressional Activity

The 118th Congress may revisit IIJA, IRA, and other legislation

- Strengthen provisions, or
- Reduce or remove appropriations for charging stations
- Tightening restrictions on consumer tax credits (e.g., Sen. Manchin letter to Treasury)
- Oversight of funding provisions in the IIJA and the IRA (e.g., Sen. Capito's Congressional Review Act announcement)

Issues: Impacts of Legislation

IRA Estimated GHG Emissions Reductions by Sector in 2030, Based on Rhodium Group Modeling



Source: Prepared by CRS; emissions estimates from Rhodium Group, *A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act*, August 12, 2022. https://rhg.com/research/climate-clean-energy-inflation-reduction-act/.

News from Europe

- European Parliament and European Council agree to proposal that all new cars and vans registered in Europe will be zero-emission by 2035. (October 28, 2022)
- The proposal from the European Commission on new Euro 7 standards to reduce pollutant emissions from vehicles has been released. One provision is the first-time attempt to regulate emissions from brakes and tires. (November 10, 2022)
- Ongoing effort to produce a summary report on current non-exhaust particle research from road traffic in the Nordic countries through the Nordic Road Association.
- **Contributors: Joacim Lundberg (Division of Transport and Roads), Joakim Pagels (Division of Ergonomics and Aerosol Technology), and Adam Kristensson (Division of Nuclear Physics), Lund University**

News from Asia

- More policy support for electric mobility in several countries in the ASEAN region
  - Indonesia to sell only electric cars and motorbikes by 2050
  - Singapore aims for 100% cleaner energy vehicles by 2040
  - Thailand released incentives for its electric vehicle (EV) industry to support its plan to transform 50% of its total auto production to EVs by 2030
  - The Philippines passes the Electric Vehicle Industry Development Act to pave the way for incentives and policies for e-mobility
  - Malaysia has issued tax incentives to attract EV manufacturers and develop the domestic EV assembly industry
- **Contributors: Glynda E. Bathan-Baterina (Clean Air Asia)**

Asia Vehicle Emission Standards

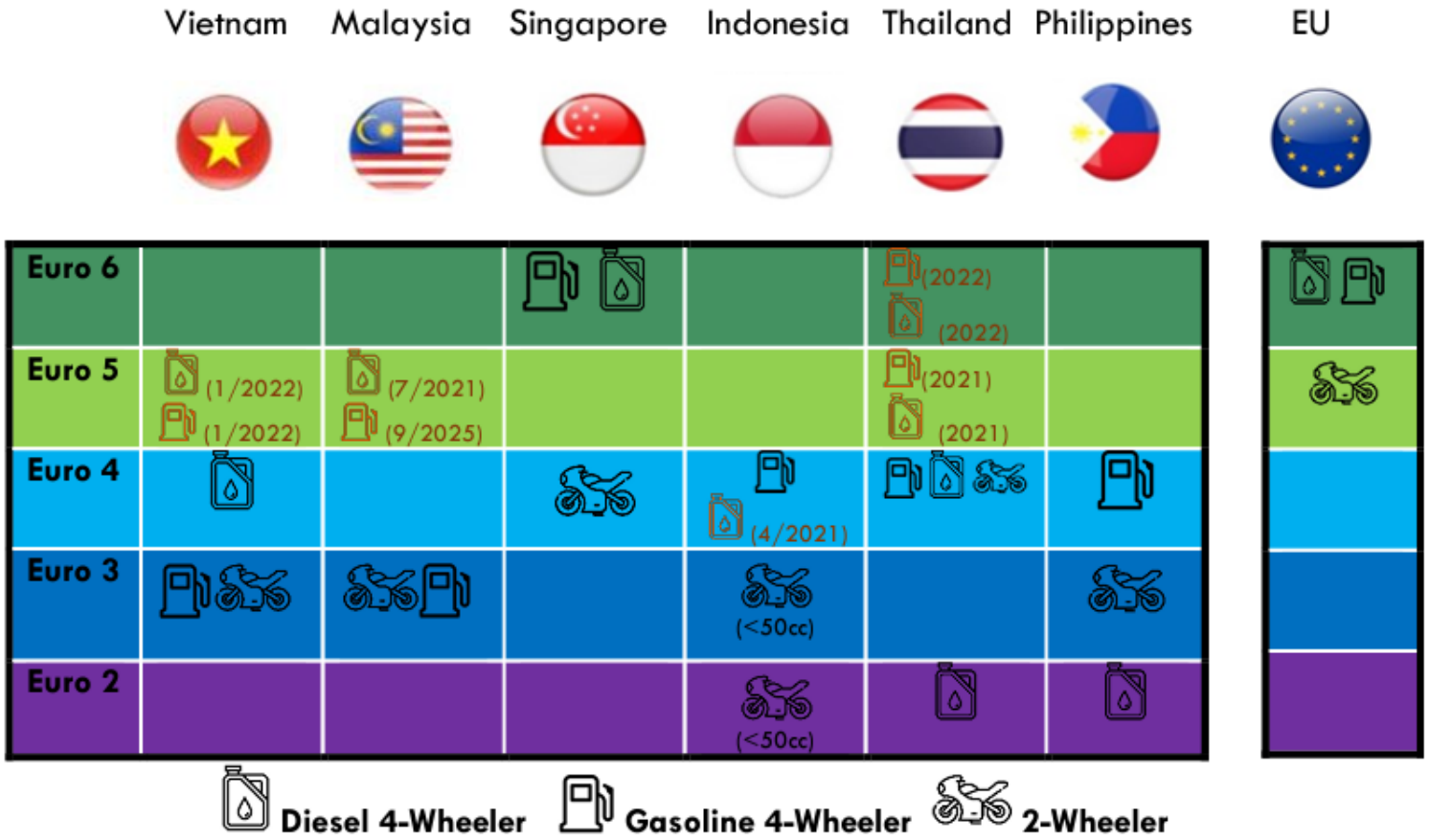


Figure 3. Standards throughout ASEAN for motorcycles, gasoline, and diesel. The EU is included to the right for comparative

Vehicle emission standards and fuel quality specifications in many ASEAN countries still lag behind Europe, China, India, Japan and the US, with most imposing Euro 4 standards. However, Euro 5/6 roadmaps for stricter vehicle emissions standards in Vietnam and Thailand are in place. Source: EU-ASEAN Business Council, June 2021

QUESTIONS

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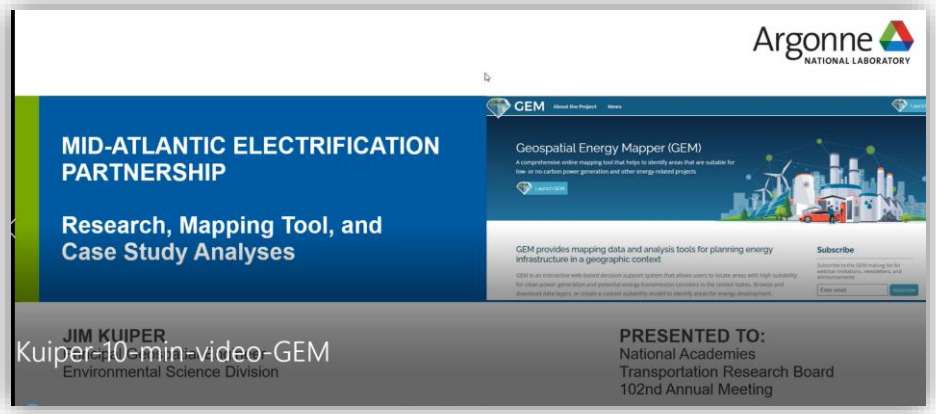
202-707-1754

Real-World Efforts Part 1

Mid-Atlantic Electrification Case Study: Argonne National Laboratory support to advance fleet electrification and address equity

- Project objectives and scope (Alleyn Harned, VA Clean Cities, 5 min.)
- Research, mapping tool, and case study analyses (Jim Kuiper, ANL, 10 min.)
- Deployment, outcomes, potential emission benefits (Joann Zhou, ANL, 10 min.)



MID-ATLANTIC ELECTRIFICATION PARTNERSHIP

Research, Mapping Tool, and Case Study Analyses

JIM KUIPER
Principal Geospatial Engineer
Environmental Science Division

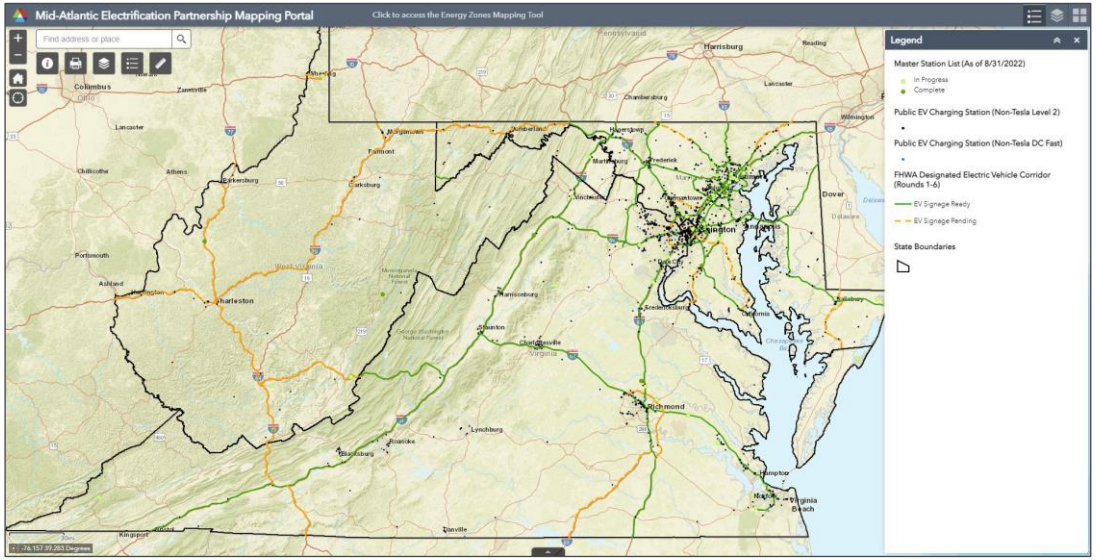
PRESENTED TO:
National Academies
Transportation Research Board
102nd Annual Meeting

January 11, 2023

MID-ATLANTIC ELECTRIFICATION PARTNERSHIP

Geospatial Research Focus

- Identify key criteria for siting EV charging stations
- Design geospatial models for several siting objectives identified by project participants
  - Emphasis on equity metrics
- Implement models in web-based mapping portals
- Support other geospatial mapping, analysis, and modeling
- Publish case study documenting the modeling process

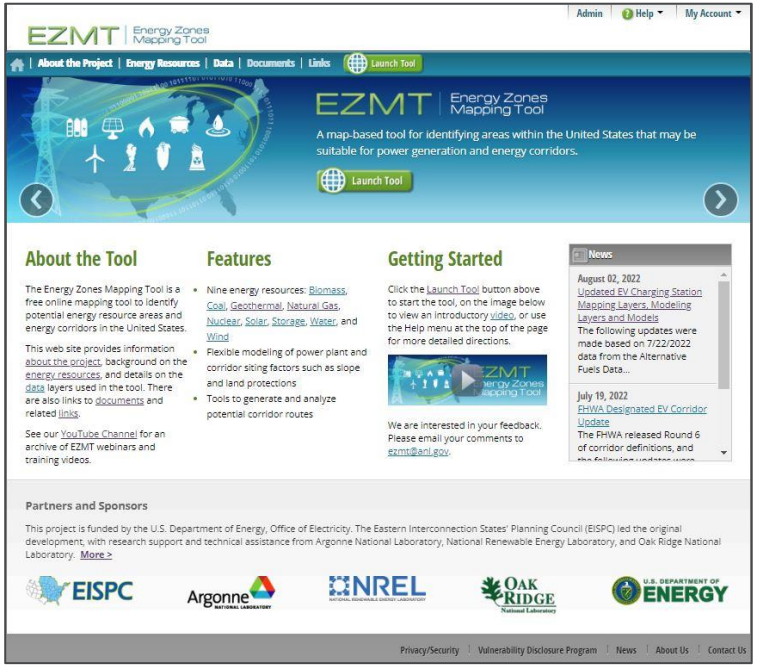


MAEP Project Area Shown Within the Project's **Mapping Portal**

ENERGY ZONES MAPPING TOOL

Project Background

- Publicly available web-based mapping tool
- Funding: U.S. Department of Energy, Office of Electricity through the American Recovery and Reinvestment Act
- Originally developed for the Eastern Interconnection States' Planning Council (EISPC*) by:
  - Argonne National Laboratory
  - Oak Ridge National Laboratory
  - National Renewable Energy Laboratory
- Subsequent collaboration with Sandia National Laboratories on energy-water nexus activities
- Launched in 2012



http://ezmt.anl.gov

*EISPC is now part of the National Council on Electricity Policy

EZMT ACTIVITIES FOR EVSE AND EQUITY

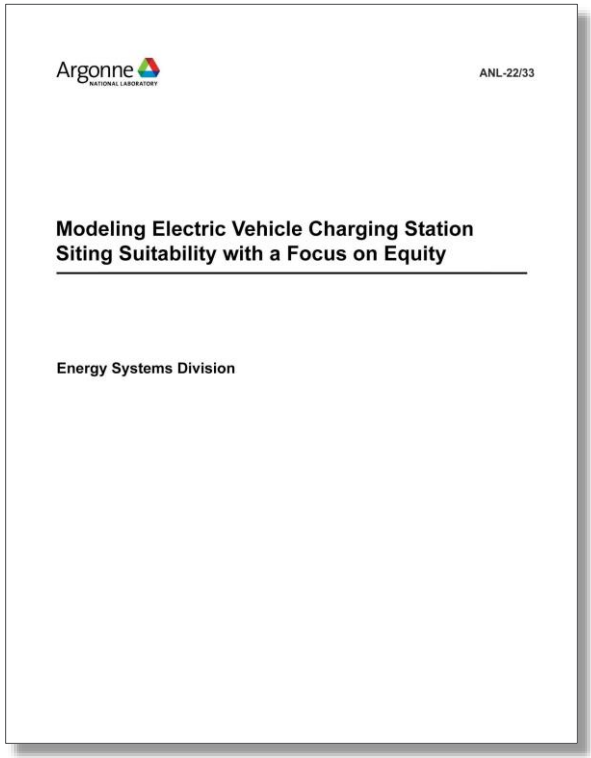
Enhancements for EVSE Planning Applications

- Added 21 mapping layers (11 EVSE, 10 equity)
- Added 21 modeling layers (13 EVSE, 8 equity)
- Added 3 example EVSE models (Corridor, Urban TNC, Rural)
- Presented webinars publicizing the capabilities
- EZMT added to AFDC Tools page (https://afdc.energy.gov/tools)

Example EZMT model result showing areas close to Round 6 EV corridors and substations of 220kV and greater

RECENT TECHNICAL REPORTS

RECENT TECHNICAL REPORTS


Argonne NATIONAL LABORATORY

ANL-22/33

Modeling Electric Vehicle Charging Station Siting Suitability with a Focus on Equity

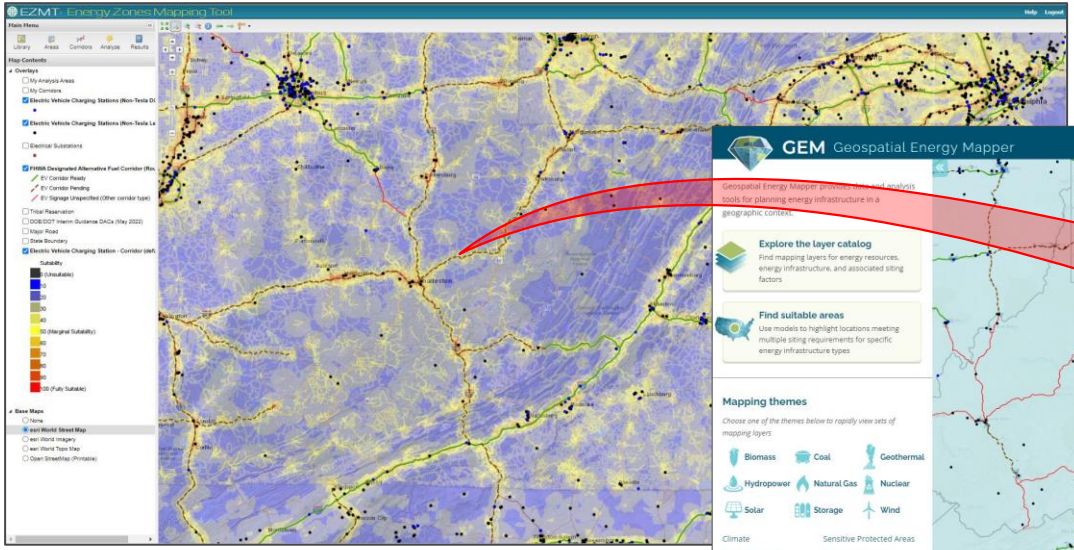
Energy Systems Division

Available at https://doi.org/10.2172/1887567

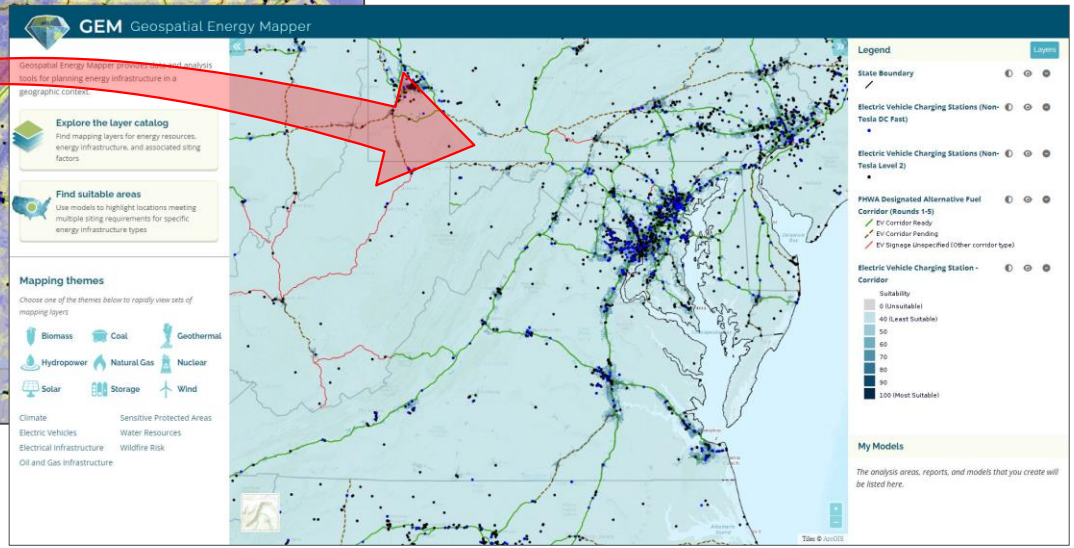
- Explains the modeling process
  - Defining the objective
  - Identifying key criteria and associated data
  - Assigning suitability scores and ranking criteria
  - Computing model results
  - Using the results for planning
- Provides three analysis examples for siting EV charging stations
  - Urban transportation network company
  - Rural
  - Designated corridor
- Appendix shows step-by-step process of running one of the models in the Energy Zones Mapping Tool (which is now easier in GEM)

GEM IS BASED ON THE EZMT

Redesigned, re-engineered, and rebranded

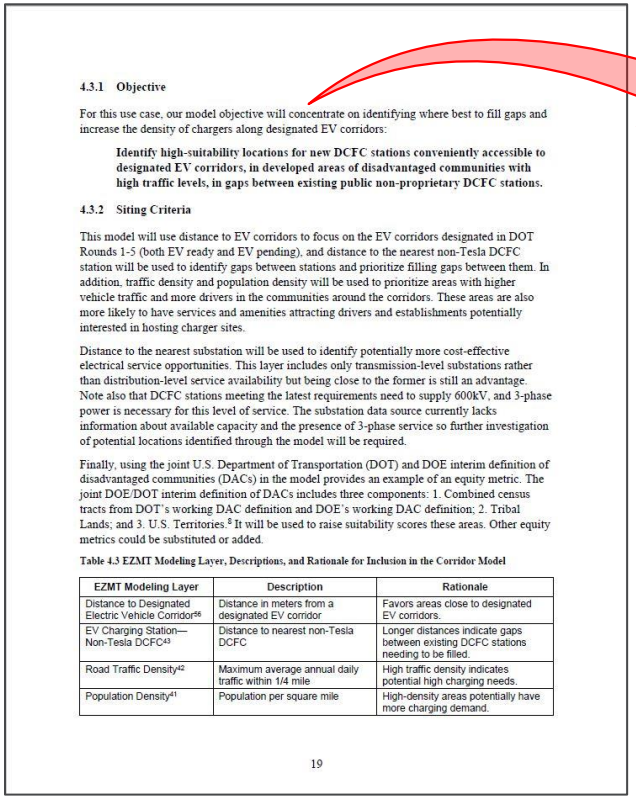


Energy Zones Mapping Tool (EZMT)
https://ezmt.anl.gov



Geospatial Energy Mapper (GEM)
https://gem.evs.anl.gov

CASE STUDY EXAMPLE FOR TODAY'S DEMO



4.3.1 Objective

For this use case, our model objective will concentrate on identifying where best to fill gaps and increase the density of chargers along designated EV corridors:

Identify high-suitability locations for new DCFC stations conveniently accessible to designated EV corridors, in developed areas of disadvantaged communities with high traffic levels, in gaps between existing public non-proprietary DCFC stations.

4.3.2 Siting Criteria

This model will use distance to EV corridors to focus on the EV corridors designated in DOT Rounds 1-5 (both EV ready and EV pending), and distance to the nearest non-Tesla DCFC station will be used to identify gaps between stations and prioritize filling gaps between them. In addition, traffic density and population density will be used to prioritize areas with higher vehicle traffic and more drivers in the communities around the corridors. These areas are also more likely to have services and amenities attracting drivers and establishments potentially interested in hosting charger sites.

Distance to the nearest substation will be used to identify potentially more cost-effective electrical service opportunities. This layer includes only transmission-level substations rather than distribution-level service availability but being close to the former is still an advantage. Note also that DCFC stations meeting the latest requirements need to supply 600kV, and 3-phase power is necessary for this level of service. The substation data source currently lacks information about available capacity and the presence of 3-phase service so further investigation of potential locations identified through the model will be required.

Finally, using the joint U.S. Department of Transportation (DOT) and DOE interim definition of disadvantaged communities (DACs) in the model provides an example of an equity metric. The joint DOE/DOT interim definition of DACs includes three components: 1. Combined census tracts from DOT's working DAC definition and DOE's working DAC definition; 2. Tribal Lands; and 3. U.S. Territories.[8] It will be used to raise suitability scores these areas. Other equity metrics could be substituted or added.

Table 4.3 EZMT Modeling Layer, Descriptions, and Rationale for Inclusion in the Corridor Model

EZMT Modeling Layer	Description	Rationale
Distance to Designated Electric Vehicle Corridor[56]	Distance in meters from a designated EV corridor	Favors areas close to designated EV corridors.
EV Charging Station—Non-Tesla DCFC[43]	Distance to nearest non-Tesla DCFC	Longer distances indicate gaps between existing DCFC stations needing to be filled.
Road Traffic Density[42]	Maximum average annual daily traffic within 1/4 mile	High traffic density indicates potential high charging needs.
Population Density[41]	Population per square mile	High-density areas potentially have more charging demand.

19

Available at https://doi.org/10.2172/1887567

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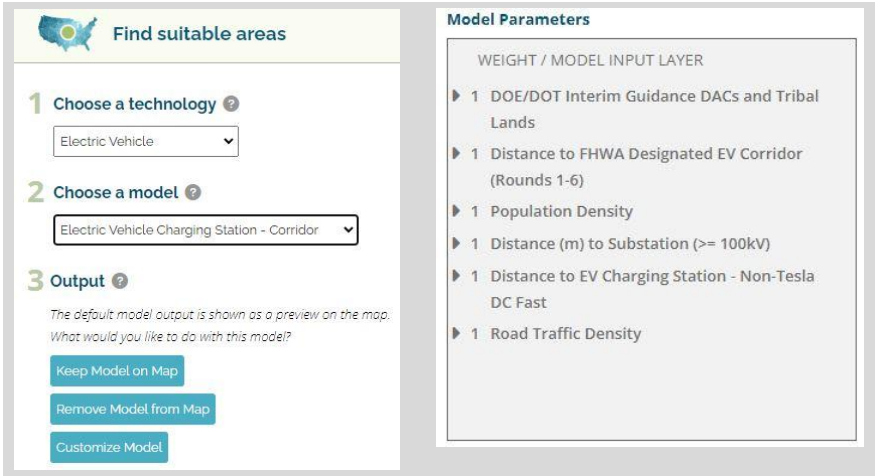
For this use case, our model objective will concentrate on identifying where best to fill gaps and increase the density of chargers along designated EV corridors:

Identify high-suitability locations for new DCFC stations conveniently accessible to designated EV corridors, in developed areas of disadvantaged communities with high traffic levels, in gaps between existing public non-proprietary DCFC stations.



Portions of GEM modeling interface (https://gem.anl.gov)

Live demonstration of Geospatial Energy Mapper (GEM)
https://gem.anl.gov

- Quickly start using GEM with mapping themes
- Explore the layer catalog for mapping and data download
- Use models to find suitable areas for electric vehicle charging stations
- Incorporate equity metrics in the analyses

Geospatial Energy Mapper (GEM): https://gem.anl.gov
Energy Zones Mapping Tool (EZMT): https://ezmt.anl.gov

Jim Kuiper - JKuiper@anl.gov

Questions?

This work is supported by the USDOE Office of Grid Deployment, and the Vehicle Integration Program in the USDOE's Office of Energy Efficiency and Renewable Energy, under Contract DE-AC02-06CH11357.

MID-ATLANTIC ELECTRIFICATION PARTNERSHIP

DEPLOYMENT, OUTCOMES, POTENTIAL EMISSIONS BENEFITS

YAN (JOANN) ZHOU
Principal Transportation Analyst/Group Lead
Energy Systems and Infrastructure Analysis

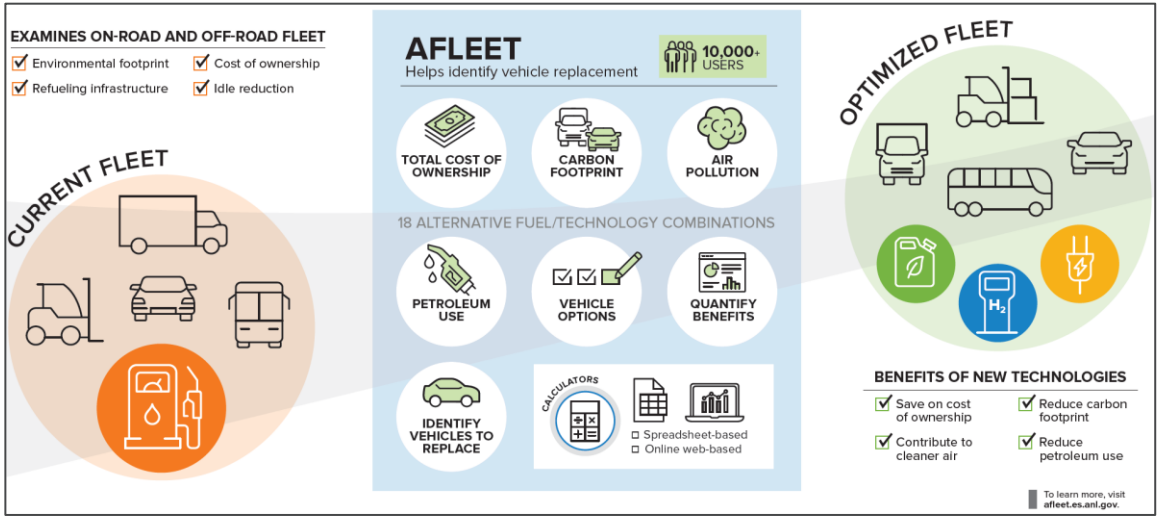
PRESENTED TO:
National Academies
Transportation Research Board
102nd Annual Meeting

January 11, 2023

AFLEET EXAMINES THE ENVIRONMENTAL AND COST BENEFITS OF DEPLOYING ALTERNATIVE FUEL VEHICLES AND INFRASTRUCTURE

For MAEP, the focus will be on electrification in EJ neighborhoods

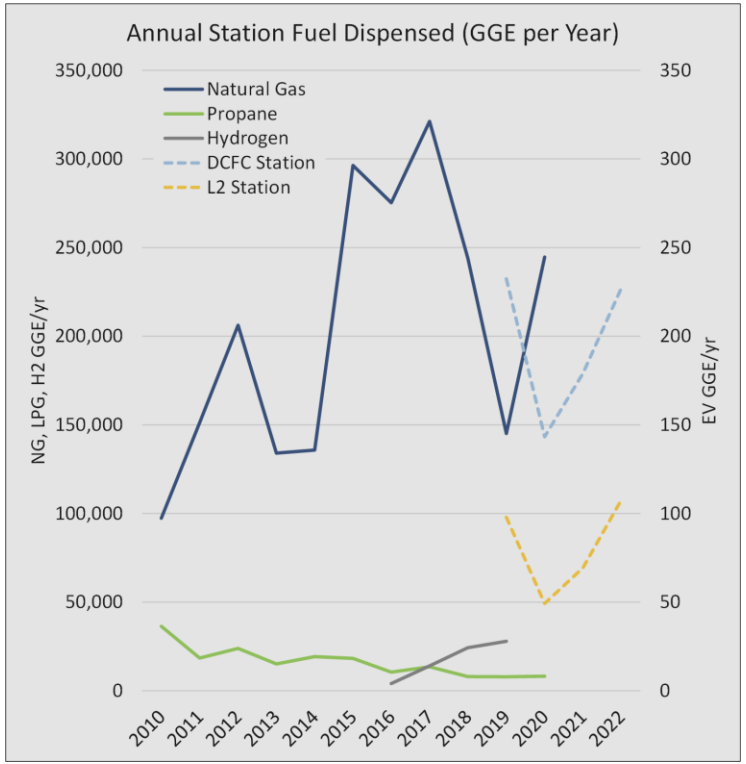
- **Will examine GHGs and air pollutant impacts of EVSE use.**
- **AFLEET converts air pollutant emissions to health costs**
- **AFLEET is called out in the Bipartisan Infrastructure Law**



https://afleet.es.anl.gov/home/

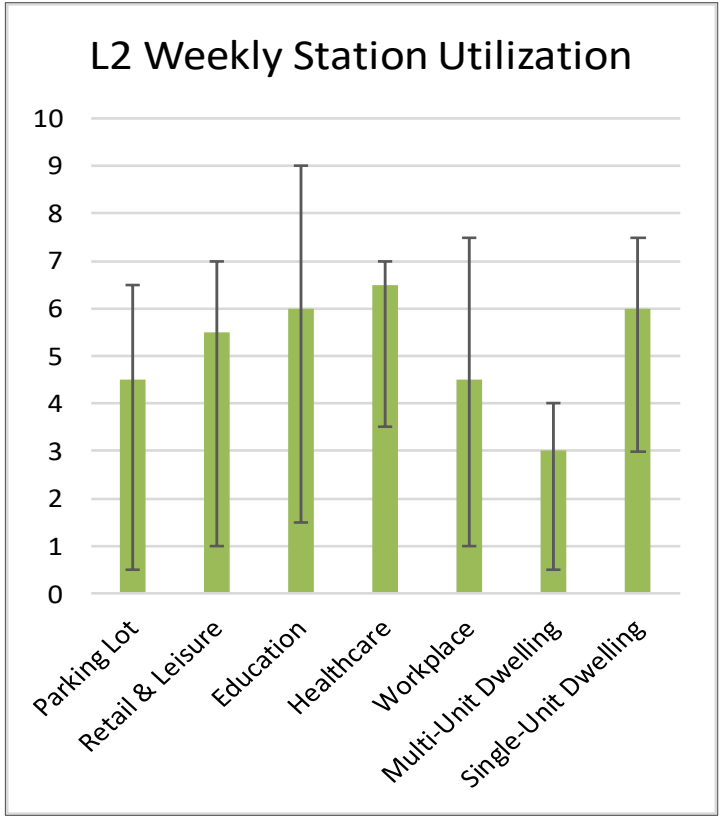
AFLEET BIL INFRASTRUCTURE EMISSIONS CALCULATOR

- **Standalone spreadsheet tool for grant proposals**
  - Structure will be incorporated into AFLEET
- **Methodology using AFLEET EV charging calculator**
  - Apply for EV, H_2, NG, LPG
    - GHG and air pollutant emissions
    - Upstream production (grid mix, RNG, etc.)
    - Vehicle mix (LDV vs HDV)
- **Peer review of data and methodology and user testing of the interface**
- **Webinar to introduce the tool in FY23**

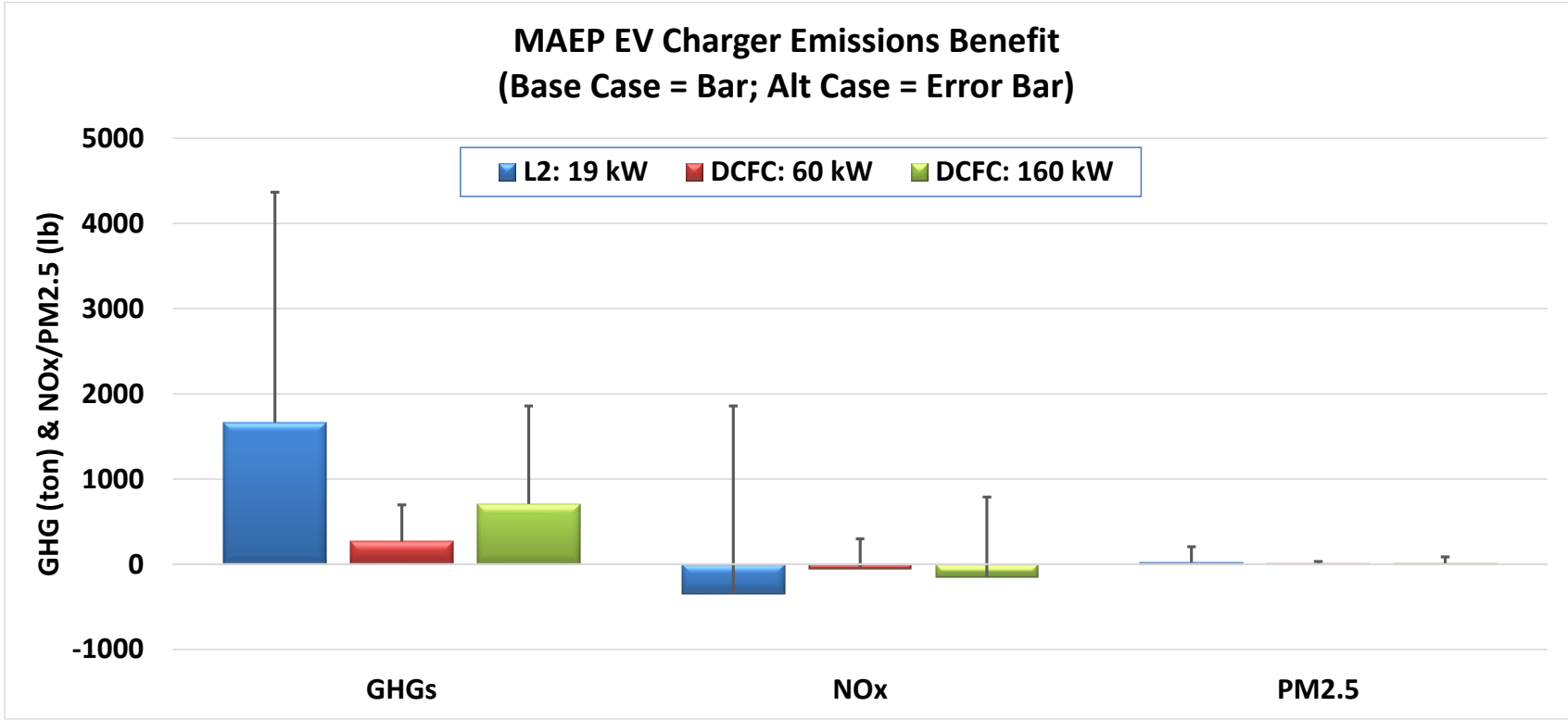


MAEP EV CHARGER EMISSIONS ANALYSIS: KEY FACTORS

- **Charger types**
  - 350 L2 (19.2 kW)
  - 25 DCFC (60 kW)
  - 25 DCFC (160 kW)
- **Charger utilization (charging time per day)**
  - Base: 6% L2 and 4% DCFC [EV Watts data]
  - Alt case: 12% L2 and 8% DCFC
- **Grid mix**
  - Base: NG 42%, Coal 28%, Nuclear 18%, Renewable 8%, Oil 4% [PJM 2021]
  - Alt case: NG 50%, Coal 10%, Nuclear 20%, Renewable 20%
- **Vehicle mix**
  - Assume 100% LDVs



MAEP CHARGER USE WILL LEAD TO GHG AND PM2.5 REDUCTIONS, BUT NOx MAY BE HIGHER DUE TO THE GRID MIX



TOOLS FOR EV CHARGING HUB OWNERS AND OPERATORS AND FLEETS

CHECT (Charging Hub Economic and Costing Tool)

Estimate the levelized cost of charging ($/kWh) for EV charging hubs

Resident owned

Utility owned

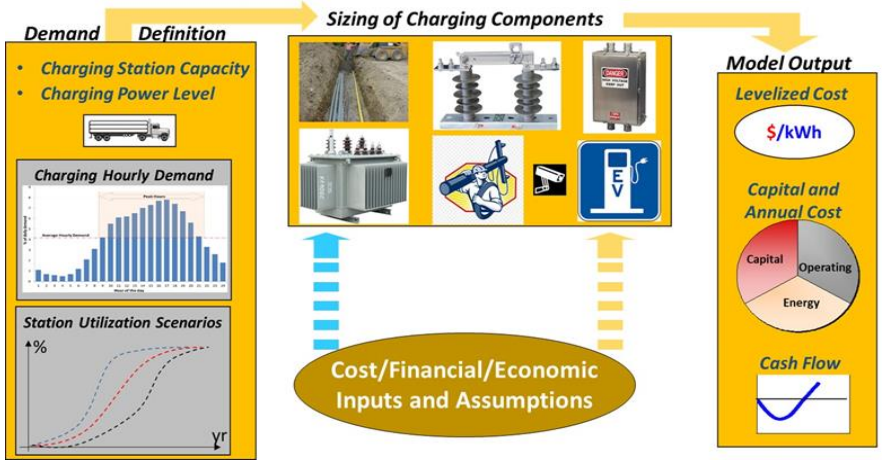
Private company owned

AFLEET's Utility Electricity Rate Calculator

Determine consumer, public, or fleet annual charging-related electricity costs.

HEVISAM (Heavy-duty Electric Vehicle Infrastructure Scenario Analysis Model)

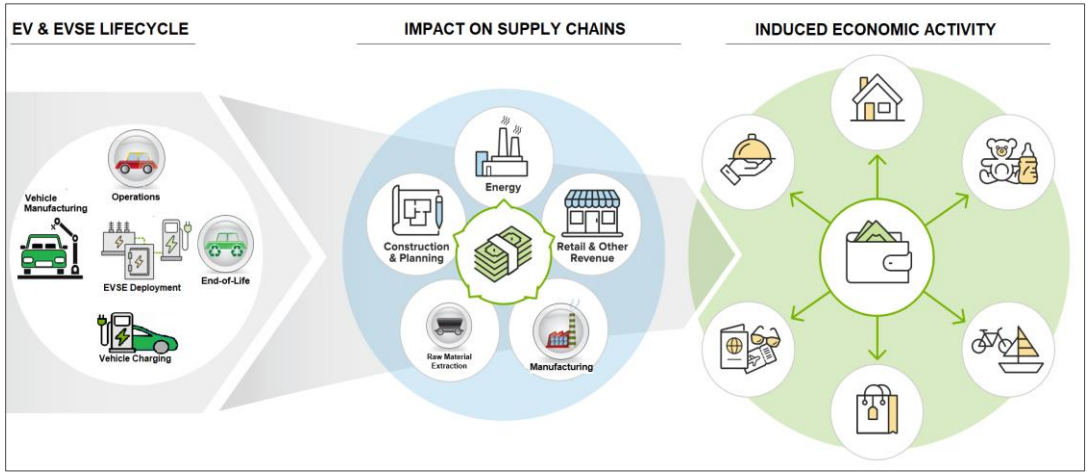
Estimate the levelized charging cost ($/kWh) for a DCFC station designed for a medium- and/or heavy-duty electric fleet.



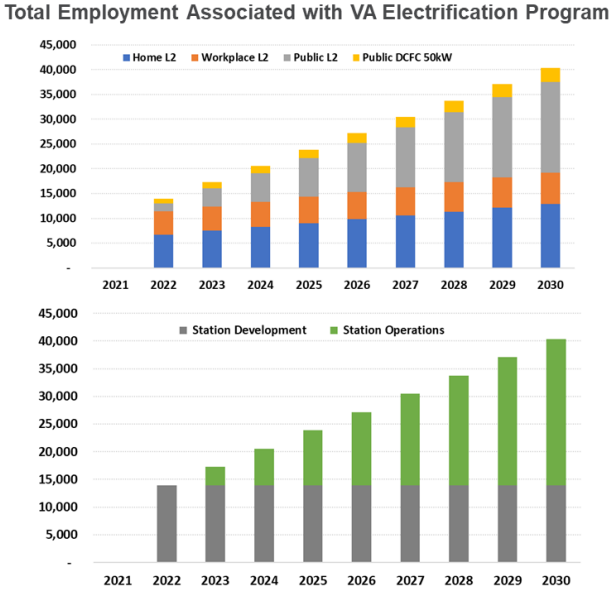
https://www.anl.gov/esia/decision-support-for-ev-charging-cost-analysis

JOBS TOOLS ESTIMATE THE DIVERSE REGIONAL AND SECTORAL ECONOMIC IMPACTS OF ALTERNATIVE FUEL VEHICLE AND INFRASTRUCTURE DEPLOYMENT

- **JOBS tools use a holistic approach to estimate gross supply-chain and induced economic impacts (jobs, wages, GDP) due to alternative fuel infrastructure**



https://www.anl.gov/esia/jobs-evse




Argonne
NATIONAL LABORATORY

Real-World Efforts Part 2

Fleet Electrification, EJ Communities, and Avoiding Unintended Consequences

- Case illustrations (**Dr. Regan Patterson, UCLA**, **15 min.**)

Prior Experience

- Transportation Equity Research Fellow, Congressional Black Caucus Foundation, Inc. (CBCF)
- Community Engagement Office, Bay Area Air Quality Management District
- Biomonitoring program, California Office of Environmental Health Hazard Assessment
- Communities for a Better Environment, climate justice initiative
- Bayview Hunters Point (San Francisco) Environmental Justice Response Task Force

FLEET ELECTRIFICATION, EJ COMMUNITIES, & AVOIDING UNINTENDED CONSEQUENCES

DR. REGAN PATTERSON, UCLA

RACIAL-ETHNIC DISPARITIES IN TRAFFIC-RELATED AIR POLLUTION

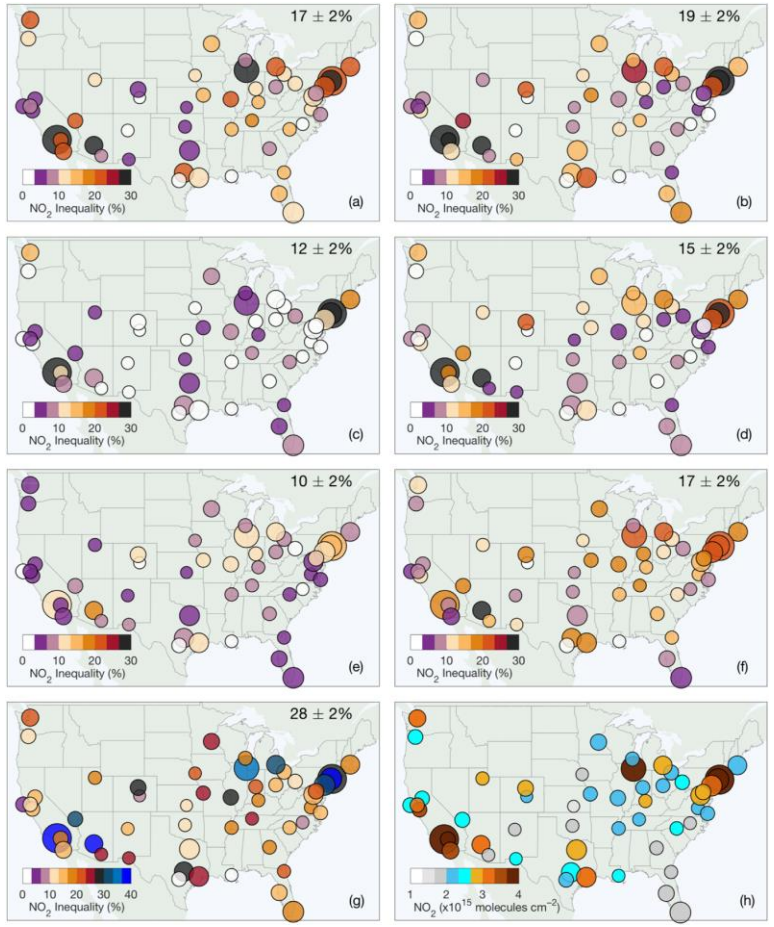
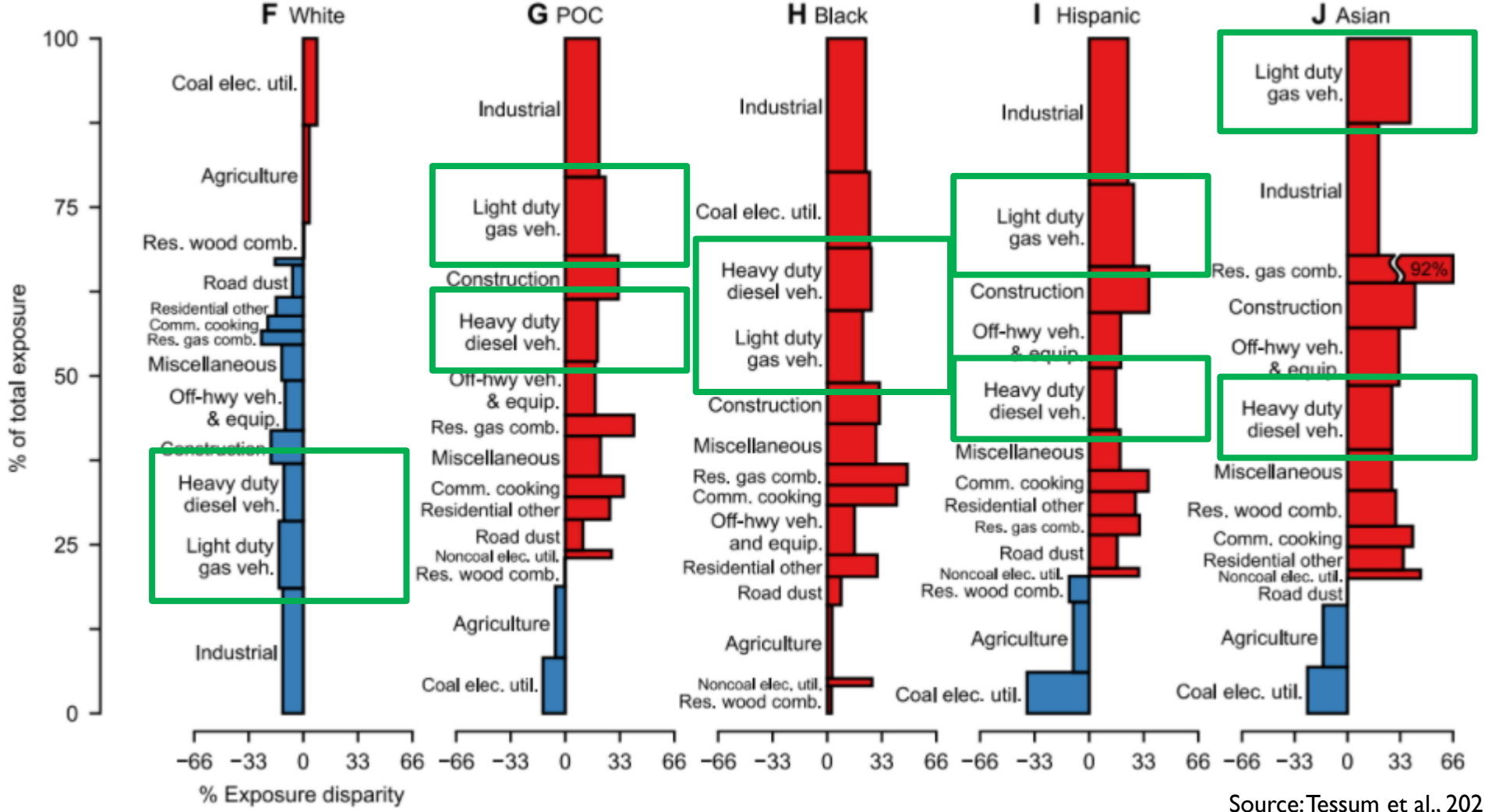


Figure 1. Relative NO_2 inequalities (percentage difference between population-weighted NO_2 means) for 52 major US cities over all days in June 2018–February 2020. Marker size reflects the total city population with the smallest markers representing cities with <1.5 million residents and the largest markers for cities with >10 million residents. Average NO_2 inequalities are shown for Black and African American (a), Hispanic/Latino (b), Asian (c), and Native American (d) compared to white residents. Inequalities are also mapped for people living near (e) and below (f) versus above the poverty line and for LINs compared to HIWs (g). Displayed mean values for each group are weighted by urban population size. City-averaged NO_2 tropospheric vertical column densities are shown (h).

Source: Demetillo et al., 2021

RACIAL-ETHNIC DISPARITIES IN TRAFFIC-RELATED AIR POLLUTION

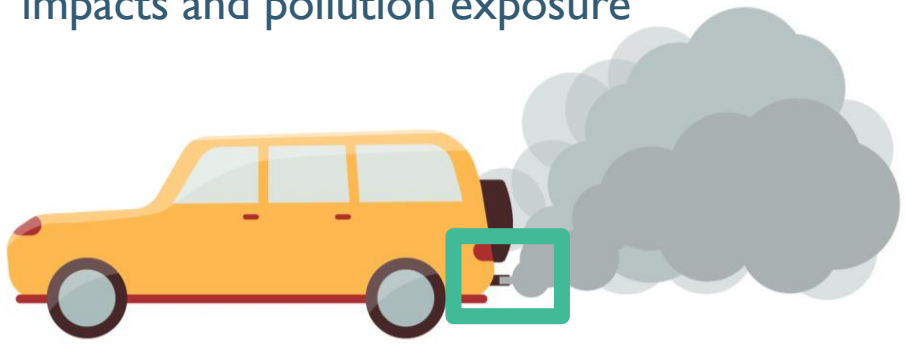


Source: Tessum et al., 2021

ZERO TAILPIPE EMISSION VEHICLES

TECHNICAL

- Problem: Tailpipes emit climate and criteria air pollutants that contribute to disparities in climate impacts and pollution exposure



- Solution: Electric vehicles

AUTOMOBILES

Non-Exhaust Emissions

Tire, brake, and road wear and road dust resuspension are important sources for traffic-related PM emissions

Battery Production

Environmental and Indigenous land rights impacts in the US and globally

Auto Manufacturing

Pollution from new hybrid and EV production sites exacerbate environmental injustices

Electricity Generation

Fossil fuels are the largest sources of electricity generation in the US (61%)

Source: Patterson, 2022

URBAN ROAD DENSITY

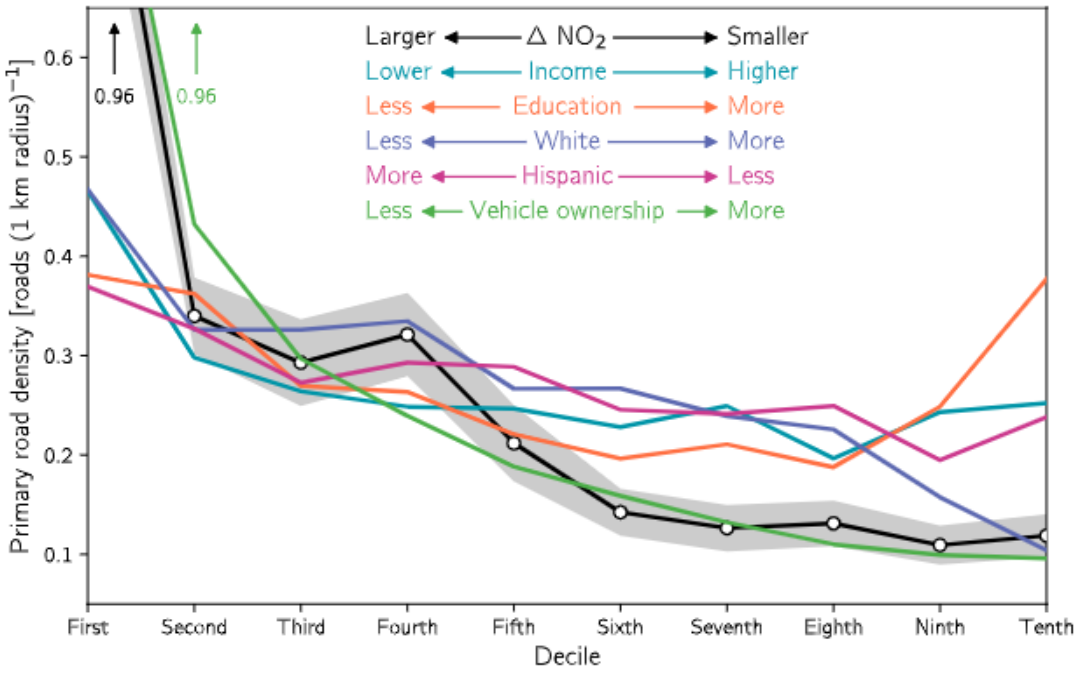


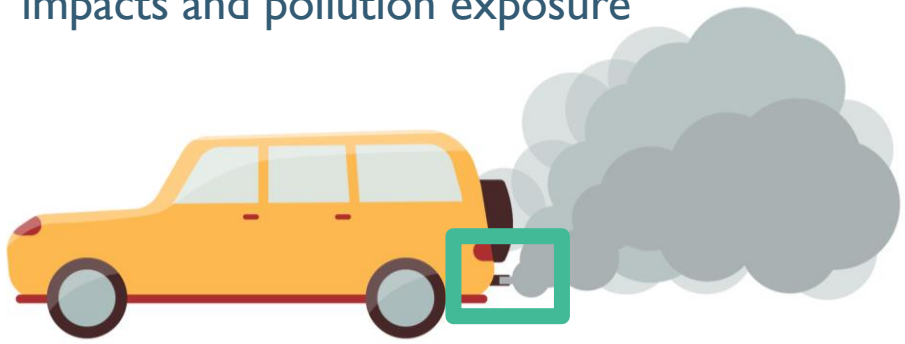
Fig. 3. The relationship of road density with urban lockdown-related drops in NO_2 columns and demographic variables. Road density is calculated as the number of primary road segments within a 1-km radius of tracts' centroids for each decile of demographic variables. The colored legend indicates the directionality of each demographic variable. As an example, the density corresponding to the lowest decile of the "White" curve represents the road density in urban tracts that are the least White (i.e., in the first decile of the percentage of their population that is White). Shading for the ΔNO_2 curve illustrate the 90% CI.

Source: Kerr et al., 2021

FRAMING

TECHNICAL

- Problem: Tailpipes emit climate and criteria air pollutants that contribute to disparities in climate impacts and pollution exposure



- Solution: Electric vehicles

ROOT CAUSES

- Problem: An automobile-dominated transportation system, which disadvantages communities of color and low-income communities

INFRASTRUCTURE INEQUITY

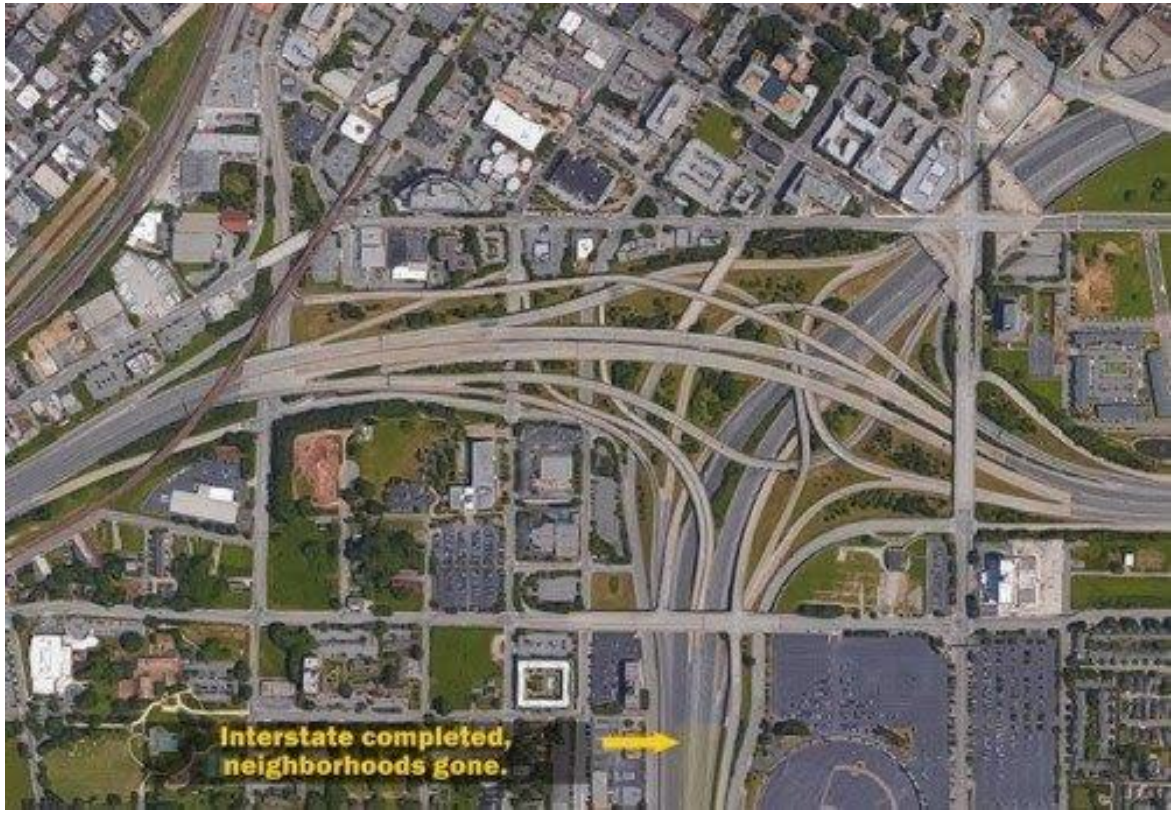
Chrysler Freeway construction in Detroit, MI

INFRASTRUCTURE INEQUITY

Hastings Street, a main street running through Paradise Valley and Black Bottom, predominantly Black neighborhoods in Detroit, MI

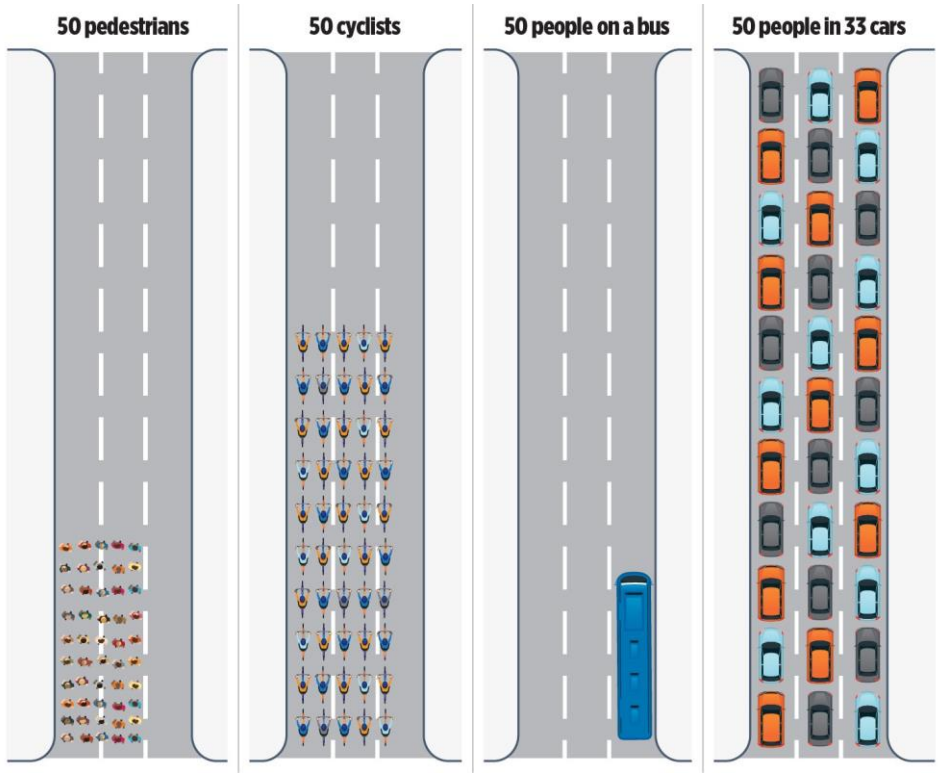
Chrysler Freeway, as viewed from the same location

INFRASTRUCTURE INEQUITY



TRANSFORMATIVE TRANSPORTATION FUTURE

- How do we design communities and technologies that reduce automobile dependency and prioritize environmental justice, infrastructure equity and transportation justice?



Source: inquirer.com

PRIORITIZE ELECTRIFICATION OF PUBLIC TRANSIT & EXPAND BUS INFRASTRUCTURE

Source: prnewswire.com

RECONNECTING COMMUNITIES

A rendering of the proposed plan for I-375 in Detroit, Michigan. ***Michigan Department of Transportation***

Source: grist.org

- How do we design communities that reduce automobile dependency and prioritize environmental justice, infrastructure equity and transportation justice?

Twitter: @Regan_Felice

Email: reganfp@ucla.edu

Real-World Efforts Part 3

Panel Discussion and Breakout

https://docs.google.com/spreadsheets/d/1HSOOk-gR9D-bNiQxy6abhrYfYrawiaFSCulJzbvQgUo/edit?usp=sharing

- Panel (moderator, M. Hatzopoulou): lessons, research needs (Alleyn, Joann, Jim, Regan, 15 min.)
- Breakout discussion:
  i. Groups discuss (25 min.):

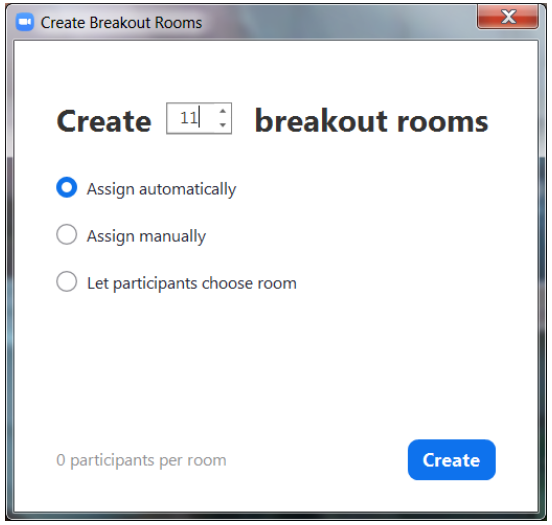
What was most useful to you about these case study discussions?
What future case studies would you like to see?
What research will best connect research to practice (any topic)?

Group 1: Greg Barnes (RK&K), Georges Bou-Saab (TTI)

Group 2: Alexandra Brun (FTA), Gabriella Cerna (ASU)

Group 3: Xuan Jiang (UC Berkeley), Joe Kaylor (Arup)

Online Participants: Gina Yeonkyeong Park (Cornell), Christina Quaassdorff (IRTEMS), Mohammadhosein Pourgholamali (Purdue)



  ii. Groups report out (Zoom participants use **Google Doc link** provided in chat) (20 min.)

Real-World Efforts Part 3

Panel Discussion and Breakout

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  i. Groups discuss (**25 min.**):
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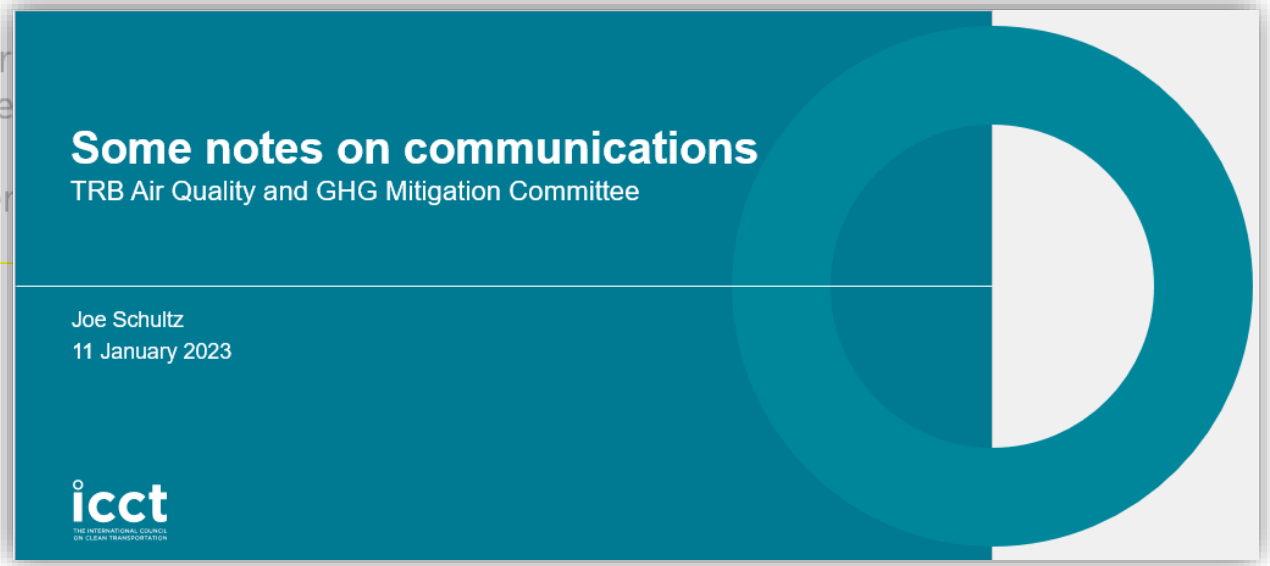
  ii. Groups report out (Zoom participants use this **Google Doc link**)

https://docs.google.com/spreadsheets/d/1HSOOk-gR9D-bNiQxy6abhrYfYrawiaFSCulJzbvQgUo/edit?usp=sharing

2022-2025 Strategic Plan: Improve Info Sharing

1. Connect research to policy: focus research priorities on policy-relevant actions
   a. Identify policy community needs, share science-based priorities with practitioners
   b. Develop findings to inform GHG control efforts in the near-term (two to five years)

2. Identify, assess, and profile informative GHG mitigation effor
   a. What was done? What obstacles were encountered? Were
   b. What real-world outcomes were achieved?
   c. What are the transferrable policy development and imple



3. Improve information sharing on GHG and air quality-related research
   a. Develop TRB e-Circulars (key topic research roadmaps – see Subcomm. Research Clusters)
   b. Improve dissemination of findings to practitioner and research-funding communities
   c. Leverage web-based communication resources
   d. Coordinate with AMS30 (Energy) and AMS40 (Alternative Fuels and Technologies)

4. Continue to improve diversification of committee participants, membership, and leadership
   a. Increase involvement by under-represented stakeholders and young professionals
   b. Address diversification through committee membership rotations
   c. Promote diversity, equity, and inclusion in research activities (e.g., paper submissions)

Some notes on communications

TRB Air Quality and GHG Mitigation Committee

Joe Schultz

11 January 2023

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

A few precepts

Some of the things we try to keep in mind that may be relevant to the committee’s planning:

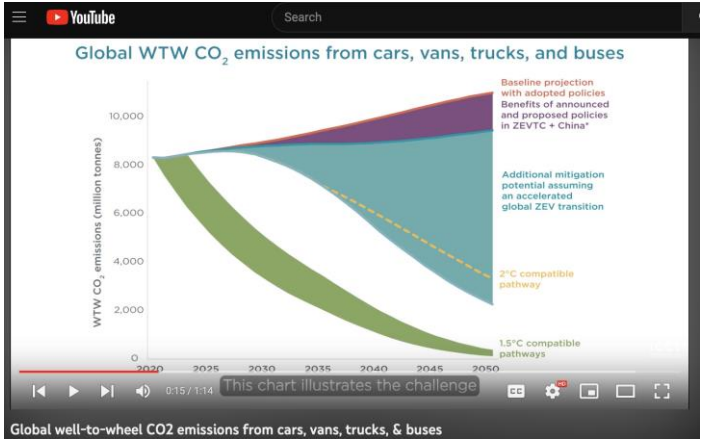
- Use what we have
- Play to our strengths
- Be realistic and patient
- Find something interesting to say

Research paper summary webinars

- Short (30 min.) moderated presentations by authors of newly released papers
- Concisely detail findings and methods, nod toward policy implications, and answer questions
- Leverage authors' current close engagement with a topic, in a congenial forum, and in a way that potentially makes the material accessible and usable to a wider audience online

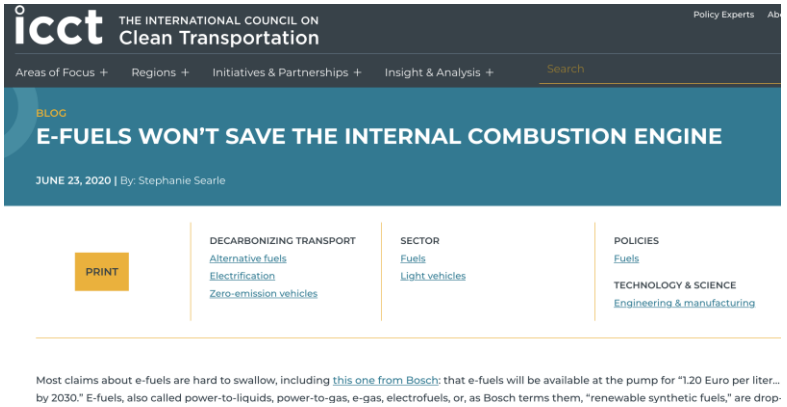
Chart of the Week *and* One Minute for Clean Transportation

- Pull from new publications: authors are up to speed and content is ready
- DIY aesthetic can work, and low budget (time and $) allows experiment
- Formats accommodate some creative thinking (e.g., selfie videos outside)
- Paring down to one minute or 200 words has broader beneficial effects



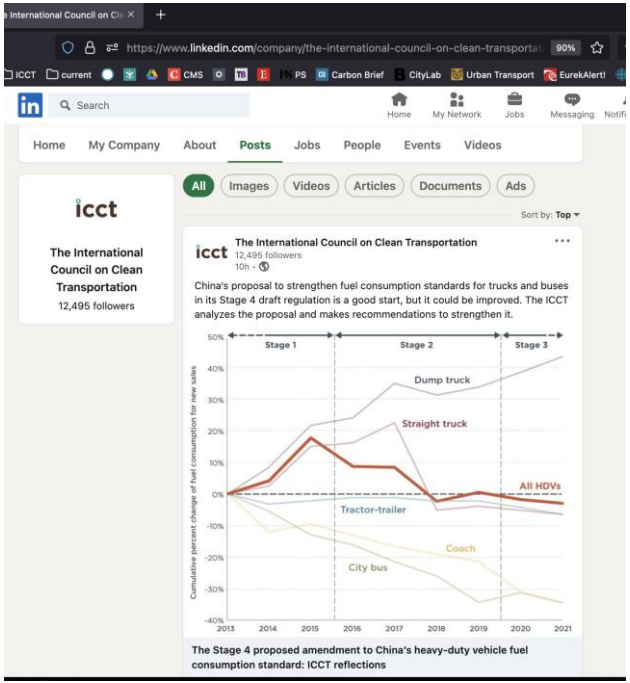
The Staff Blog

- Straightforward to do
  - (Straightforward ≠ easy)
- Versatile
- Accommodates razzle-dazzle
- Screen friendly
- Social-media friendly
- Effective



A few words about social media

- LinkedIn is growing fast
- A simple base content strategy is to repost blogs and other website content
- Key is participation by staff, bringing their individual networks into play



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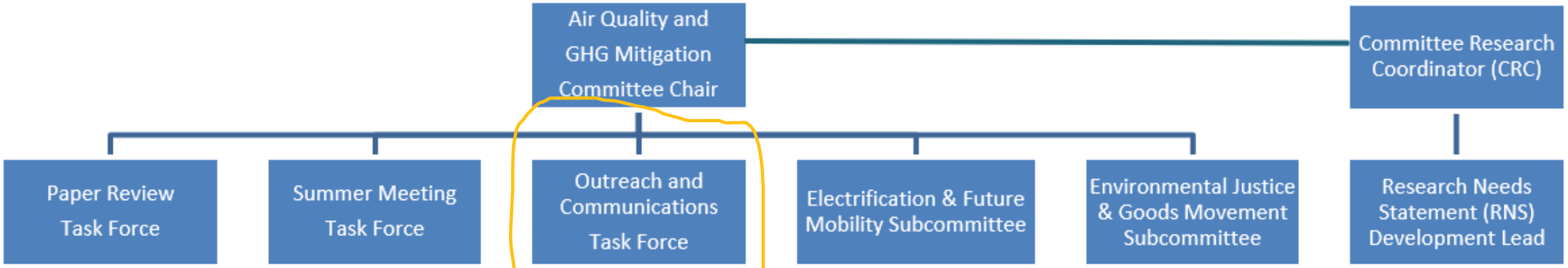
THE INTERNATIONAL COUNCIL
ON CLEAN TRANSPORTATION

2022-2025 Strategic Plan: Improve Info Sharing



Administrative Task Forces

- Paper Review
  (Greg Rowangould, Shams Tanvir)
- Summer (Mid-Year) Meeting
  (Annalisa Schilla, Ellen Greenberg)
- **Outreach & Communications**
  (new – looking for volunteers!)

Research Coordination

- Committee Research Coordinator
- Research Needs Statement Development Lead

REMINDER

NATIONAL ACADEMIES Sciences Engineering Medicine

TRB TRANSPORTATION RESEARCH BOARD

AMS10 Summer Meetings Update

2023 Summer Meeting

- Asilomar, CA
  - UC Davis Institute of Transportation Studies is holding their 19th Biennial Conference on Transportation Energy and Policy in mid-July 2023 (TRB is a co-sponsor of this event)
- We anticipate a joint committee meeting and possibly other joint activities for AMS10/30/40

2024 Summer Meeting

- Sustainability Section-wide Research Symposium in Denver, CO
  - Joint session for AMS10/30/40
  - Avoiding conflicts – Aiming for late June, mid-July, or early August 2024
    - Are you aware of other industry events taking place around the same time we should avoid?
  - Volunteers!

Volunteer Roles

Role	Approximate Need from Each Committee
Co-chair for overall planning	1 person
Tour Ideas/Logistics	1-2 people to participate in larger group to help plan for conference-wide tour options
Research topic session planning	3 people to either lead or help with sessions
Lessons learned session planning	3 people to either lead or help with sessions
Practitioner-focused session planning	3 people to either lead or help with sessions
Open Mic Session Planning	1-2 people to work with other volunteers on one "open mic" session
Social Event Planning	1-2 people to work with other volunteers on an evening social event
Notetakers	Need TBD, but please indicate willingness if you plan on attending

Want to help shape these events?

Contact me:

annalisa.schilla@arb.ca.gov

Volunteer Roles and Appreciations!

1	Marcus Alexander	Electric Power Research Institute
2	Hanjiro Ambrose	University of California, Davis
3	**Song Bai**	Bay Area Air Quality Mgt. District
4	Glynda Bathan	Clean Air Asia
5	Alexander Bigazzi	University of British Columbia
6	Kanok Boriboonsomsin	UC Riverside
7	Cindy Copeland	Boulder County Public Health
8	John Davies	Federal Highway Administration
9	**Douglas Eisinger**	Sonoma Technology, Inc.
10	H. Christopher Frey	North Carolina State University
11	Zhiming Gao	Oak Ridge National Laboratory
12	**Ellen Greenberg**	California Department of Transportation
13	Marianne Hatzopoulou	Univ. of Toronto
14	**Jingnan Hu**	Chinese Research Academy of Env. Sciences
15	Taylor LaBrecque	Maine Department of Transportation
16	Karin Landsberg	Washington State DOT
17	Rick Lattanzio	Congressional Research Service
18	Natalie Liljenwall	Oregon DOT
19	Haobing Liu	University of New Mexico
20	Joacim Lundberg	Lund University, Sweden
21	Victoria Martinez	Federal Highway Administration
22	Ray Minjares	Internat'l Council on Clean Transp.
23	**Jenny Narvaez**	N. Central TX Council of Governments
24	R. Chris Owen	U.S. EPA
25	Christopher Porter	Cambridge Systematics
26	Christopher Ramig	U.S. EPA
27	**Gregory Rowangould**	University of Vermont
28	**Sandeep Sasidharan**	Ford Motor Company
29	Annalisa Schilla	California Air Resources Board
30	Shams Tanvir	UC Riverside
31	**Colleen Turner**	Maryland DOT
32	Suriya Vallamsundar	Texas A&M Transportation Institute
33	**Roger Wayson**	AECOM
34	Yanzhi Xu	Texas A&M Transportation Institute
35	**John Zamurs**	Zamurs and Associates, LLC
36	**Max (Ke) Zhang**	Cornell University

Those rotating off AMS10 in April 2023

Interested in comm. membership or volunteering?
https://forms.gle/3Y4wrVYzatb29r7b7

Volunteer Roles and Appreciations!

TRB Blue Ribbon Award for AMS10
(given Sunday morning)

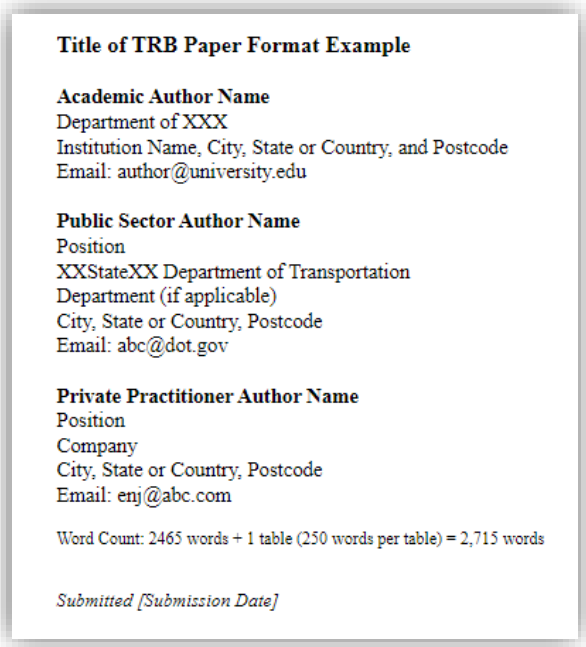
Volunteer Roles and Appreciations!

Alex Bigazzi: Subcomm. Leadership and Leadership Team
Kanok Boriboonsomsin: Subcomm. Leadership and Leadership Team
Cindy Copeland: Subcomm. Leadership and Leadership Team
John Davies: Subcomm. Leadership and Leadership Team
Andrew Eilbert: Comm. Meeting Recorder
Ellen Greenberg: Mid-Year Meeting Leadership and Leadership Team
Natalie Liljenwall: Leadership team and RNS leadership
Chris Porter: Jan. 2022 mtg. lead, TR News Decarb. Issue lead

Sept-Oct: TR News Issue

Volunteer Roles and Appreciations!

Greg Rowangould: Paper Review Chair
Shams Tanvir: Paper Review Vice Chair, Website Leadership
Annalisa Schilla: Mid-Year Meeting Leader



Title of TRB Paper Format Example

Academic Author Name
Department of XXX
Institution Name, City, State or Country, and Postcode
Email: author@university.edu

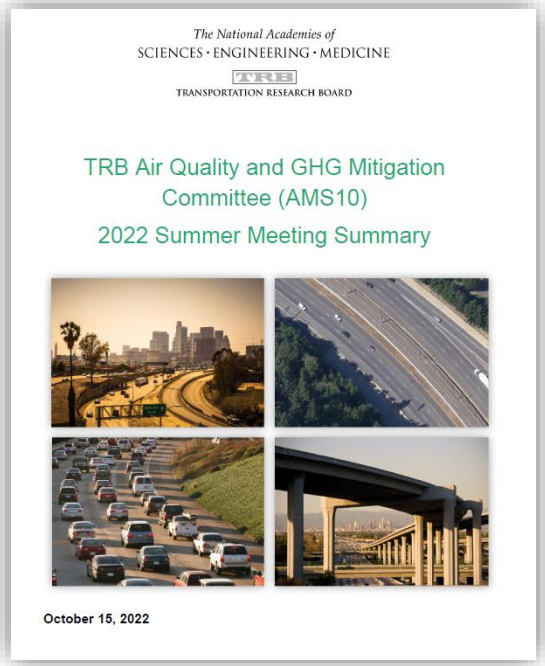
Public Sector Author Name
Position
XXStateXX Department of Transportation
Department (if applicable)
City, State or Country, Postcode
Email: abc@dot.gov

Private Practitioner Author Name
Position
Company
City, State or Country, Postcode
Email: enj@abc.com

Word Count: 2465 words + 1 table (250 words per table) = 2,715 words

Submitted [Submission Date]

June: Paper Review Planning
October: Final Decisions



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SCIENCES · ENGINEERING · MEDICINE
TRB
TRANSPORTATION RESEARCH BOARD

TRB Air Quality and GHG Mitigation Committee (AMS10)

2022 Summer Meeting Summary

October 15, 2022

June: Summer Conference
October: Meeting Summary

Volunteer Roles and Appreciations!

Marianne Hatzopoulou: Vice Chair, Leadership Team, Partner in Crime Past Six Years**, and incoming Chair (April 2023)**

- Member: "Social and Economic Factors of Transp." and "Environ. Analysis in Transp." TRB committees
- Tier 1 Canada Research Chair in Transp. Decarbonization and Air Quality
- Leader, U of T's Transp. & Air Quality (TRAQ) research group: air quality, climate change, and public health
- Director of Positive Zero Transport Futures, a living lab ecosystem for testing transport decarbonization innovations
- Associate editor of *Transp. Research Part D: Transport and Environment*

NATIONAL ACADEMIES Sciences Engineering Medicine

Transportation Research Board

Interested in Committee Membership or Volunteer Opportunities?

Let Us Know!

AMS10 interest code

Thanks for Attending and Enjoy the Rest of TRB!

Activity	Date, Day	Time (EST)
1. **Workshop**: Steering the Titanic, Decarbonizing Transp. Within Systems of Incremental Change, Convention Center (Conv. Ctr.) 146A	Jan 8, Sun	1:30 to 4:30
2. **Lectern Session** 2026: Air Quality (AQ) Modeling & Policy, Conv. Ctr. 140	Jan 9, Mon	8:00 to 9:45
3. **Poster Session** 2214: Current Issues in AQ & GHG Mitigation, Conv. Ctr. Hall A	Jan 9, Mon	3:45 to 5:30
4. Electrification & Future Mobility **Subcomm. mtg**., Marriott Marquis Chinatown (M3)	Jan 9, Mon	6:00 to 7:30 pm
5. **Lectern Session** 3135: Evaluating GHG Mitigation Potential of EVs & Climate Policies, Conv. Ctr. 140	Jan 10, Tues	1:30 to 3:15
6. Climate Change **Subcomm. mtg**. (with AMS30/40), Marriott Marquis Archives (M4)	Jan 10, Tues	6:00 to 7:30 pm
7. AQ & GHG Mitigation Comm. mtg., Marriott Marquis Archives (M4)	Jan 11, Wed	8:00 to 12:00
8. Environ. Justice & Goods Movement Subcomm. mtg., Marriott Marquis, Union Station (M3)	Jan 11, Wed	3:45 to 5:30
9. Workshop: Best Use of Nat'l EV Infrastructure Funds to Accelerate Electrification and Benefit Environ. Justice, Conv. Ctr. 146A	Jan 12, Thur	9:00 to 12:00

For more information:

TRBAirQualityGHG.org **(website)**

"It's only emission is water vapor."

Remember, the future looks good if we take effective action!

The New Yorker,
Tom Cheney,
10/6/2003

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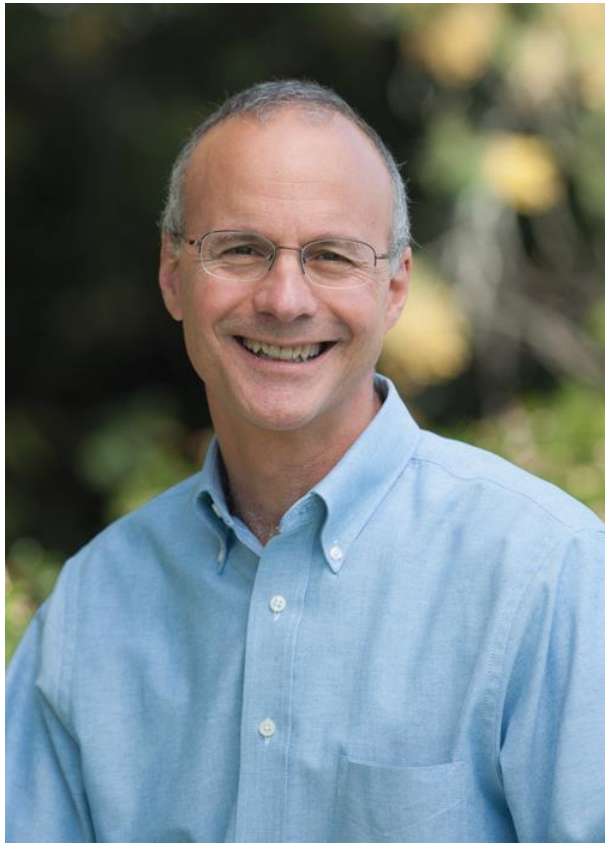

Contact information if you have questions

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