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Climate Change Challenges: Equity Issues with Electric Vehicles

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Outline of Presentation

- Introduction to the Transportation Research Board (TRB)
- The broader climate change challenge
- Why conversion of the fleet to EVs is critical to addressing climate change.
- Equity issues associated with EVs
 - Cost of purchase issues
 - Charging infrastructure issues
- Policy options to address the EV equity issues
- Education/knowledge/cultural/political issues

Transportation Research Board

- **Mission**

- Provide leadership in transportation improvements and innovation through trusted, timely, impartial, and evidence-based research, information exchange, and policy advice regarding all modes of transportation.

- **Convene**

- Annual Meeting - 14,000 attendees (in a non-COVID year)
- 177 standing technical committees
- 50+ conferences & workshops; 100+ webinars

- **Research**

- Highway, Transit, Airport, Behavioral Traffic Safety Cooperative Research Programs
- 800+ papers published annually
- TRID: 1.3 million records of transportation research citations

- **Advise**

- Independent, objective, evidence-based, thorough, non-partisan policy studies

Proposed Framework for *Critical Issues in Transportation*



A number of critical issues are related to each of the societal goals that transportation supports, and others are related to the cross-cutting dynamics.

Climate Change is Real and Is Accelerating

- Severe storms are occurring more frequently and with greater intensity.
- Both average and extreme temperatures are increasing.
- Science has clearly shown that human activity, specifically missions of greenhouse emissions, is causing an acceleration of climate change.



Credit: Business Insider

Climate Change is an Equity Issue

- Climate change disproportionately impacts disadvantaged communities.
- They are more vulnerable to flooding, heat waves, droughts, fires.
- Fewer resources to mitigate or rebound from climate change impacts or repair damage from climate-related events



Credit: Artnet

Climate Change Targets

- The Paris Climate Accord of 2015 included commitments to take actions that would reduce temperature increases to 1.5°C.
- President Biden has set an emissions reduction goal to reach net zero emissions by 2050.



Credit: Al Jazeera English

The Climate Change Challenge

- Although it varies by nation, transportation contributes about ¼ of anthropogenic greenhouse gas emissions worldwide.
- Without changing our current trends and policies, baseline emissions from transportation are projected to result in a 60-75% increase in CO₂ emissions by 2050 from 2020 levels (varies by source of information).
- If transportation contributes its fair share towards keeping global warming below 1.5°C, it will need to reduce CO₂ emissions by 78% from 2020 levels and 88% from projected 2050 baseline levels. Source: International Council on Clean Transportation

Strategies to Reduce GHG Emissions

- Conversion of the vehicular fleet to zero emission vehicles
- Emission reductions in remaining internal combustion (ICE) vehicles
- Policies to reduce travel demand
- Electricity generation from renewable sources
- Taxing and pricing policies
- Use of alternative modes of transportation
- Telecommunications as a substitute for travel

Although all of the above will need to be pursued, the vast majority of reductions will need to come from vehicular emissions reductions, i.e. decarbonization of the vehicle fleet.

Decarbonization of the Fleet

- Conversion of the vehicle fleet to zero emission vehicles is the primary means to decarbonize the fleet.
- The technology that is currently available to achieve zero emission vehicles is electric vehicles.



Credit: Electrek

Who Is Buying Electric Vehicles Today?

- By far the largest market for electric vehicles to date is California (45% of all new EV sales in the U.S. in 2021)
- Based on research from California, electric vehicle purchasers are predominantly:
 - Male
 - High income
 - Highly educated
 - Homeowners who have access to charging at home
- Studies from other states and countries show similar trends

Who Is Buying Electric Vehicles Today?

- In California 55% of plug in EV buyers are white, while whites constitute 41% of conventional car buyers
- Minorities are not buying electric vehicles in proportion to their percentage of the population.
- In Maryland, where 30% of the population is African American, only 4% of plug in electric vehicle owners are African American.
- EV buyers are not socioeconomically or ethnically representative of the population in their state.

Costs of New Electric Vehicles

- Sept. 2022 average cost of new electric vehicles: \$65,291
- Sept. 2022 average cost of all new vehicles: \$48,094
 - Source: Kelly Blue Book
- The electric vehicle market has shifted from compact sedans to SUVs and luxury cars.
- 2/3 of all vehicles purchased in the U.S. are used vehicles.
- There is a limited supply of used electric vehicles.
- The economically disadvantaged are not able to buy electric vehicles.

Incentives for Buying EVs

- Both federal and state governments have provided financial incentives for new car buyers to purchase electric vehicles.
- In states with both federal and state incentives, new electric vehicle buyers have saved as much as \$10,000 off the purchase price.
- Incentives have only been for new EVs, not used ones.
- Incentives often increase with price, thus increasing subsidies for those who can afford more expensive vehicles.
- Incentives also often are provided post purchase, thus increasing the amount of money needed at the time of purchase.
- Clean Cars 4 All Program in California is aimed at low-income and disadvantaged communities.

EV Charging Infrastructure

- Owners of electric vehicles in single family homes do most of their charging at home.
- Residents in multi-family dwellings usually do not have access to an EV charger.
 - Usually requires a designated parking space for a charger
 - Requires purchase of a charger plus installation
 - Requires permission of building owners
- If public chargers are available, the cost is usually at least double the cost of charging at home.

EV Charging Infrastructure

- Public charging infrastructure is more likely to be found in wealthier neighborhoods.
- Market demand is higher in those neighborhoods because there are more EVs there.
- This is somewhat a “chicken and egg” situation.
- \$2.5 billion in BIL/IIJA for grants for charging and fueling infrastructure
 - Priority for rural areas, low- and moderate-income neighborhoods, and communities with low rate of private parking.

Policies to Address EV Equity Issues

- Potential policies related to the price of electric vehicles
 - Rebates targeted to low income households
 - Rebates that increase as income decreases
 - Rebates at point of sale, rather than after the sale
 - Rebates for purchase of used electric vehicles
 - Rebates for private sales of EVs, not just dealer sales
 - Regulations that require auto manufacturers to produce a certain percentage of smaller, lower cost EVs in order to increase the supply of affordable EVs

Policies to Address EV Equity Issues

- Potential policies related to EV charging infrastructure
 - Local governments installing on street EV charging stations in lower income areas when the market is not providing them
 - Installing EV charging stations in off-street parking lots
 - Incentive payments to owners of multi-family dwelling units to install EV charging stations in their parking lots
 - Regulations requiring multi-family dwelling owners to install EV chargers as part of new buildings or for older buildings
 - Rebates for purchase of private EV charging hardware, including installation costs, by lower income households

Education/Knowledge Challenges

- Many in disadvantaged communities are not aware of the facts related to EV ownership, including:
 - Lower operating costs
 - Lower maintenance costs
 - Rebate programs for purchasing EVs
 - Advances in range of EVs on a single charge
- The messenger is often as important as the message.
- Policies will only be effective if citizens are aware of and take advantage of them.

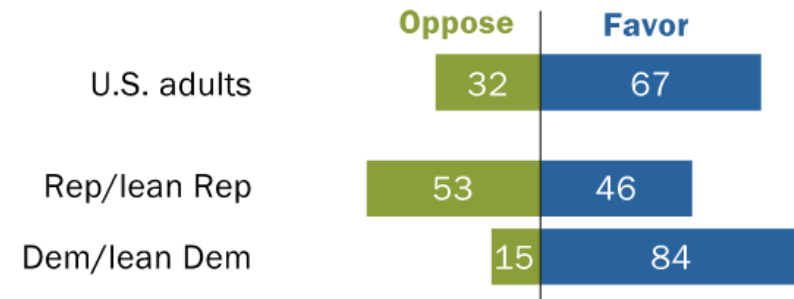
Addressing the Cultural/Political Divide

- Secretary Pete Buttigieg: “there’s a bit of a cultural issue, which is just making sure people understand that this is not just something for urban, presumptively liberal drivers taking short trips around big coastal cities.”

– Source: Vox Magazine, Oct.12, 2022

Two-thirds of Americans back incentives for hybrid and electric vehicles

% of U.S. adults who ___ providing incentives to increase the use of hybrid and electric vehicles



Note: Respondents who did not give an answer are not shown.
Source: Survey conducted May 2-8, 2022.

“Americans Divided Over Direction of Biden’s Climate Change Policies”

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Summary

- Climate change disproportionately impacts disadvantaged communities.
- Conversion of the fleet to EVs is critical to addressing climate change.
- There are clear equity issues associated with EVs
 - Cost of purchase issues
 - Charging infrastructure issues
 - There are policy options to address the EV equity issues if there is the political will to implement the policy options.

Sources of Information

- Although multiple sources were used for the information in this presentation, the two principal sources were:
 - The International Council on Clean Transportation, “A Strategy to Decarbonize the Global Transport Sector by Mid-Century,” 2021, <https://theicct.org/publication/vision-2050-a-strategy-to-decarbonize-the-global-transport-sector-by-mid-century/>
 - Scott Hardman, Kelly Fleming, Eesha Khare, and Mahmoud M. Ramadan, “A Perspective on Equity in the Transition to Electric Vehicles,” *MIT Science Policy Review*, 2021, <https://sciencepolicyreview.org/2021/08/equity-transition-electric-vehicles/>
- Other sources are shown on the slides.

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- TRB TRID database: www.trid.trb.org
- TRB Annual Meeting, Washington, DC, Jan. 8-12, 2023



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