

## MEDIA FRAMING OF ELECTRIC VEHICLES IN U.S. NEWSPAPERS

Rosalee A. Clawson

Professor

[clawsonr@purdue.edu](mailto:clawsonr@purdue.edu)

Andie Lee

Staff Research Assistant, B.A. Political Science

[andielee@gmail.com](mailto:andielee@gmail.com)

Whitney M. Tyler

Graduate Student

[tyler48@purdue.edu](mailto:tyler48@purdue.edu)

Department of Political Science

Purdue University

**ACKNOWLEDGEMENTS:** Special thanks to Kamilah Valentin Diaz for her assistance with data collection through the ASPIRE Research Experience for Undergraduates program. We greatly appreciate Purdue's Ross-Lynn Fellowship program, which supported Whitney Tyler's work on this project. We thank the ASPIRE Systems of Systems-Adoption Baseline team as well as the entire ASPIRE team (<https://aspire.usu.edu/>) for their many helpful suggestions. This paper builds on earlier research by Clawson and Lee presented at the 2022 Annual Meeting of the Midwest Political Science Association. We appreciate the useful comments from our Midwest discussant and fellow panelists.

This work is based upon research supported as part of the ASPIRE (Advancing Sustainability through Powered Infrastructure for Roadway Electrification) award, an Engineering Research Center program by the National Science Foundation (NSF), grant no. EEC-1941524. The views and conclusions contained herein are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of NSF, or the U.S. Government.

## **MEDIA FRAMING OF ELECTRIC VEHICLES IN U.S. NEWSPAPERS**

### **ABSTRACT**

The Biden administration has emphasized transportation and environmental justice as two of its top priorities. President Biden, and other Democratic leaders, have touted the widespread adoption of electric vehicles as a transportation innovation that will substantially reduce greenhouse gas emissions thereby improving air quality, public health, and quality of life, especially for minority communities that are disproportionately affected by emissions. The automobile industry is also planning for an electric car future with major companies announcing ambitious goals for electric vehicle production and adoption. In this paper, we examine how the media cover this major transportation transformation. Specifically, we ask: how do the U.S. media frame electric vehicles? And to what extent is equity considered in the discourse? We investigate coverage of electric vehicles in the *New York Times* between 2017 and 2022. This timeframe allows us to document a baseline of coverage during the Trump presidency when vehicle emissions standards were weakened and there was active hostility toward anything to do with equity, as well as examine the first two years of the Biden administration during which electric vehicles and social justice were emphasized. Our analysis shows that a variety of frames were used to construct coverage of electric vehicles with Business Frames the most common throughout the period. In contrast, Equity Frames structured very little of the coverage. There were mentions of equity considerations, however, in nearly one-third of the news stories, and these mentions were more common in the past four years and more likely to be mentioned in stories that also referenced the Biden administration. We conclude by discussing the implications of this media coverage for the adoption of, and politics surrounding, electric vehicles.

## INTRODUCTION

The Biden administration has emphasized infrastructure, climate change, and racial justice among its top priorities. One of President Biden's first executive orders, announced on January 27, 2021, was "Tackling the Climate Crisis at Home and Abroad" (Exec. Order No. 14008, 2021), which established the Justice40 Initiative. The Justice40 Initiative "aims to deliver 40 percent of the overall benefits of federal investments in climate and clean energy, including sustainable transportation, to disadvantaged communities" (Justice40 Initiative 2022).

President Biden, and other Democratic leaders, have touted the widespread adoption of electric vehicles (EVs) as sustainable transportation because EVs will substantially reduce greenhouse gas emissions. In turn, the reduction of greenhouse gas emissions will improve air quality, public health, and quality of life, especially for minority communities that are disproportionately affected by emissions (Tessum et al. 2021). Proponents argue that EVs are critical for a sustainable and equitable transportation future. At the same time, EV proponents (and opponents) recognize there are equity challenges to widespread electric vehicle adoption.

The automobile industry is also planning for an electric car future with major companies announcing ambitious goals for EV production and adoption. *Car and Driver*, for example, recently stated, "Electric cars are the future, and each year we've seen automakers add more EVs to their lineups. Everyone is working on electric vehicles, from well-established existing manufacturers to new names such as Byton, Canoo, and Rivian" (Car and Driver 2022). Other news reports characterize this transportation transformation as an "invasion" of EVs (Root 2021), and anyone who watched the two most recent Super Bowls likely noticed that electric vehicles dominated the car ads (Clifford 2022; Mandel 2023).

Electric vehicles made up nearly 10 percent of the new cars sold in 2022 in the United States, and the adoption of electric vehicles globally is increasing dramatically (Diaz 2023; Electric Vehicles and Hybrids 2022). Many Americans are "on the fence" about whether they would buy an electric vehicle, but younger Americans indicate greater openness to buying EVs compared with Baby Boomers (Spencer and Funk 2021; see Kumar and Alok [2020] for a review of the literature on electric vehicle adoption).

For the environmental and equity benefits of electric vehicles to be fully realized, widespread adoption of EVs is necessary. Studying media coverage of electric vehicles allows us to understand the messages people receive about EVs and consider the ways in which those messages may bolster or hinder adoption. *In this research, we are interested in the media's framing of electric vehicles and whether concerns over equity play a role.* We ask two questions: what media frames are used in coverage of electric vehicles? And are equity considerations incorporated into the coverage?

To answer these questions, we examine U.S. media coverage of electric vehicles in the *New York Times* between 2017 and 2022. This timeframe allows us to document a baseline of coverage

during the Trump presidency when vehicle emissions standards were weakened and there was active hostility toward anything to do with equity, as well as examine the first two years of the Biden administration during which electric vehicles and social justice were emphasized. We find that a variety of frames are used, including Business, Technology, Infrastructure, Partisan Conflict, Sustainability, Value (to individual consumers), Green Industry, and Equity frames. The Business Frame is consistently the most common, making up nearly one-half of the coverage. Sustainability is the next most common frame at 14 percent of the coverage.

Throughout the six-year period, the *New York Times* rarely uses an Equity Frame to discuss electric vehicles. Despite President Biden's emphasis on transportation equity and environmental justice through his Justice40 Initiative, the Equity Frame does not become appreciably more common during 2021 and 2022. There are, however, mentions of equity considerations in about one-third of the news articles between 2017 and 2022, and these mentions are more likely to appear in articles that also reference the Biden administration during 2021 and 2022.

In the next section, we briefly review literature on media framing, media coverage of electric vehicles (EVs), and equity issues around electric vehicles. We then turn to our research design and present our findings in more detail. We close with a discussion of the implications of this media coverage for the adoption of, and politics surrounding, electric vehicles.

## **MEDIA FRAMING, MEDIA COVERAGE OF EVs, AND EQUITY ISSUES**

### **Media Framing**

Framing is a powerful tool used to influence how ideas are communicated. The mass media can shape public and elite opinion by framing issues in distinct ways. "Framing is the process by which a communication source, such as a news organization, defines and constructs a political issue or public controversy" (Nelson, Clawson, and Oxley 1997, 567). The principal function of a frame is to promote an issue's definition, causal interpretation, and moral evaluation (Entman 1993).

Similarly, a frame can be understood as a story line that supplies meaning to a sequence of events or ideas (Gamson and Modigliani 1987). Gamson and Lasch aver that ideas are not isolated within a culture; rather, they are grouped into harmonious clusters or interpretive packages (1983). A frame presents a principal organizing theme that offers clarity to the ideas being presented. Metaphors, exemplars, catchphrases, depictions, and visual images are elements of framing used to construct a coherent story line (Gamson and Lasch 1983).

Entman argues that the two most significant components of framing are selection and salience (1993). The process of framing begins with the selection of certain aspects of an issue and continues by making those aspects most salient within the communicative text. There is a strategic nature to framing. When journalists and political elites frame an issue, it is their intent

to convince the public to accept and understand the issue as they have constructed it. “Elites wage a war of frames because they know that if *their* frame becomes the dominant way of thinking about a particular problem, then the battle for public opinion has been won” (Nelson and Kinder 1996, 1058).

Nelson, Clawson, and Oxley (1997) examine the psychological mechanism that leads to framing effects and demonstrate that media frames alter the importance of considerations in people’s judgments thereby influencing individuals’ attitudes. Specifically, they show that when the media frame a KKK rally as a disruption of public order rather than a free speech issue, individuals are less supportive of the Klan making a speech or holding a rally in their city. The public order frame causes individuals to weigh public order values as more important in their evaluation of the Klan, thus leading to less tolerance of Klan activities.

The framing research suggests that frames will be effective when citizens see the communication source as credible (Druckman 2001). Frames from partisan sources can lead citizens of a different political persuasion to resist the message, thus diminishing or even countering the effect of a frame (Slothuus and de Vreese 2010). At this point, electric vehicles are a relatively non-partisan issue (“Consumer Interest” 2020). Although certainly there have been partisan attacks on EVs by extremists like Representative Marjorie Taylor Greene<sup>1</sup> (R-GA), the Biden administration took great pains to pursue a bipartisan path on infrastructure spending. Also, although one study in Ohio shows that Democrats are more likely to adopt EVs than Republicans (Sintov, Abou-Ghalioumi, and White 2020), electric vehicles have not become polarized along partisan lines at the level of many other issues. Our research is important because it provides a baseline of electric vehicle media coverage in the United States during the Trump and Biden presidencies, which will allow us to track whether and how frames change over time. This will be especially critical if Republican elites decide en masse to turn electric vehicles into a partisan issue.

It is also important to study media framing of electric vehicles at this key moment when President Biden has focused on sustainable and equitable transportation through his infrastructure policies. The Biden administration has successfully pushed for major investments in infrastructure, resulting in the Bipartisan Infrastructure Law (BIL) signed into law on November 15, 2021. The BIL provides billions of dollars of funding for transportation projects and requires equity considerations to be addressed (Bipartisan Infrastructure Law 2022). The time period under study captures the passage of the BIL and the first year of its implementation.

### **Media Coverage of Electric Vehicles**

There is limited research on media coverage of electric vehicles. A study of New Zealand newspaper and magazine coverage of cars between 2011 and 2019 showed that the framing of electric vehicles was quite positive. For example, 65 percent of the car articles in the *New*

---

<sup>1</sup> See Representative Greene’s ads (Schwartz 2021) and speeches (The Hill 2021).

*Zealand Herald* used positive words to describe electric vehicles (Broadbent, Wiedmann, and Metternicht 2021).

Another study examined social media posts on electric vehicles between 2011 and 2020 (Ruan and Lv 2022). Analyzing over 3 million Reddit posts, Ruan and Lv (2022) demonstrate that users employ a wide variety of topics to discuss electric vehicles. Some of those topics include customers, investors, technology, policy, and the environment. Using a sentiment analysis, Ruan and Lv show that some of the most positive Reddit discussions happen around technology, whereas some of the most negative posts occur around the environment and the impact of EV adoption on climate change. These negative discussions on EVs and the environment are common in fringe and conspiracy Reddit communities.

In a pilot study of newspaper coverage of electric vehicles in the United States, Clawson and Lee (2022) analyzed two national newspapers and five local newspapers between January and June 2021. They found that a variety of frames were used to cover electric vehicles, including Business, Infrastructure, Sustainability, Partisan Conflict, Technology, Green Industry, and Value. There was not one single frame that dominated the majority of the coverage, but the Business Frame was the most common with one-third of the articles articulating EVs as an economic issue. Somewhat surprisingly given the Biden administration's emphasis on Justice40, Clawson and Lee found no evidence of an Equity Frame in news coverage of Biden's first few months in office. They did show, however, that "equity considerations" were mentioned in 44 percent of the stories. These equity considerations included discussions of EV affordability, access to charging stations, the impact on workers because EVs require fewer people to make and maintain, and federal infrastructure investment in low-income and minority communities. In this study, we build on the Clawson and Lee (2022) research to examine *New York Times* coverage of electric vehicles between 2017 and 2022.

### **Electric Vehicles and Equity**

As electric cars have become more popular over the past decade, it is increasingly important that we understand the equity issues surrounding electric vehicles. EV proponents emphasize the key role widespread electric vehicle adoption can play in mitigating climate change through the reduction of greenhouse gas emissions from the transportation sector. This decrease in pollution will improve public health and quality of life, especially in Black and Brown communities that are disproportionately affected by emissions (Tessum et al. 2021).

At the same time, the transformation toward an electrified transportation future raises serious equity concerns about the manufacturing, adoption, and public policies surrounding EV deployment. Researchers are particularly interested in inequities associated with affordability and the financial programs meant to encourage adoption; pollution and air quality changes; accessibility and charging infrastructure placement; and the impact of mining, energy generation, and battery destruction on vulnerable communities. Here we review this scholarly work on EV equity issues, which helps inform our analysis of how the news media cover equity concerns.

Regarding affordability, scholars have found several prominent inequities associated with the financial programs meant to incentivize electric vehicle adoption. They have found that income tax credit systems are most beneficial to the wealthy and inaccessible to middle and low-income populations (Ju, Cushin, Morello-Frosch 2020; Ku and Graham 2022). The incentive programs also primarily give tax credits to high-income individuals with the fewest credits going to low-income individuals (Lui et al. 2022). When rebates are included in the program, they are geographically clustered in areas with low levels of air pollutants, mainly wealthy and majority-white communities (Guo and Kontou 2021). Other financial incentive programs, like fuel taxes and bonus-malus schemes, disproportionately burden low-income populations and suburban and rural populations (Vidyattama, Tanton, and Nakanishi 2021; Pyddoke et al. 2021). Scholars have also found that the high costs of electric vehicles and electrification infrastructure are major barriers to public busing and private vehicle electrification (Al-Qadi, 2021; Zhou et al. 2021). Financial programs related to electric vehicles primarily benefit wealthy, white communities and are either burdensome or unaffordable for low-income, minority communities.

Scholars are also deeply concerned with the inequities associated with air pollution distribution and the potential for significant pollution decreases associated with electric vehicles. Scholars have found that EV ownership is concentrated in wealthy, white neighborhoods (Ju, Cushin, Morello-Frosch, 2020; Ku and Graham, 2022), whereas the highest levels of emissions and poorest air quality are found in low-income, Black, and Brown communities (Guo and Kontou, 2021; Zhu et al. 2022). Emissions from vehicles are most likely to negatively impact low-income Black and Brown communities (Boehmer et al. 2013; Tessum et al. 2021). Considering the high exposure to emissions around ports and bus routes, several scholars believe the government should prioritize electrifying bus routes and port vehicles over the private fleet to achieve the most benefit in decreasing pollution zones (Penn et al. 2022; Zhu et al. 2022). There is also a concern about the inequity of EVs outsourcing their pollution in the energy generation process to low-income rural communities (Penn et al. 2022). Scholars have largely found that positive changes in air pollution related to electric vehicle adoption are not currently benefiting the communities most in need.

Many scholars are investigating the inequities associated with accessibility and EV charging infrastructure placement. Public charging stations are predominantly located in affluent and white communities (Caulfield et al. 2022). Ill-planned charging infrastructure can lead to gentrification (Henderson 2020). The higher the affluence in an area, the higher the density of household (private) charging infrastructure (Caulfield et al. 2022), creating an extra financial barrier to EV adoption (Lee and Brown 2021). Low-income communities have lower household energy hosting capacity than high-income communities and may not be able to supply EV charging infrastructure safely (Brockway 2021). Private charging infrastructure costs and the hassle of time-consuming public charging deter middle and low-income consumers from electrification (Lee and Brown, 2021). Charging infrastructure cost and access are major barriers

to EV adoption in middle and low-income minority communities, whereas wealthy white communities have more access to private and public charging infrastructure.

Scholars also examine the inequities associated with the life-cycle aspects of electric vehicles—specifically in battery production, energy generation, and battery destruction—and the impact on vulnerable communities. The batteries used in electric vehicles require precious metals like cobalt, lithium, and copper. The mining process for these metals often involve the exploitation of women and children, the subjugation of ethnic minorities, and environmental and public health risks (Sovacool et al. 2019; Sovacool et al. 2020). In the energy generation process, there are significant procedural justice issues associated with the planning and installation process. There is the improper acquisition of Native American Lands for solar farms (Mulvaney 2017), and the discounting of local resistance to windmill energy generation facilities (van Bommel and Hoffken 2021). For both U.S. solar farms and French windmill farms, local representatives are not adequately included in energy production site placement procedures (Mulvaney 2017; van Bommel and Hoffken 2021). The EV lifecycle also has significant inequities associated with the destruction of the batteries. The process for the disposal and recycling of lithium batteries and other e-waste can be extremely toxic to workers and the local environment, has strong ties to the exploitation of women and children, and encourages ethnic and religious discrimination (Sovacool et al. 2020). The inequities associated with EV battery production, energy generation, and battery destruction have disastrous results for communities where these processes occur.

In all, scholars have found significant equity concerns associated with all stages of electric vehicle manufacturing and deployment. We aim to understand whether these equity concerns around affordability, racial disparities, pollution, accessibility, and vulnerable communities are conveyed to the public through media coverage. We analyze whether an equity frame is used to discuss electric vehicles and whether equity considerations are mentioned in the media coverage.

## **RESEARCH DESIGN**

We investigate U.S. media coverage of electric vehicles in the *New York Times*. We chose the *New York Times* because it is a large-circulation, national newspaper read by political elites and engaged citizens. It is a venerable paper that helps shape the political and social context in which EV adoption occurs.

We examine news coverage of electric vehicles between January 1, 2017 and December 31, 2022. We selected this 6-year timeframe to capture coverage of EVs in the four years prior to the Biden administration as well as two years during the Biden presidency. As we mentioned earlier, the Biden administration has designated infrastructure, climate change, and racial equity as top priorities. Biden officials have promoted electric vehicles as a solution to the climate



crisis and have prioritized environmental justice and equity concerns in the development and deployment of electrified transportation.

We downloaded the *New York Times* articles from the Nexis Uni database. Our aim was to compile a set of articles that were electric vehicle-centric. Following the search protocol developed by Clawson and Lee (2022), we identified those articles that mentioned electric vehicles at least three times by using these search terms: `Atleast3(electric vehicle) OR atleast3(zero-emission) OR atleast3(“EVs”) OR atleast3(electric car)`. After reviewing the articles and removing any duplicates, the search returned 496 articles. See Table 1 for the frequency of articles by year. The least coverage of EVs occurred in 2020 with 44 articles, and the most occurred in 2021 with 199 articles, coinciding with the Biden administration’s first year in office. We assigned each newspaper article a unique identification number, and the article is the unit of analysis.

**Table 1. Frequency of *New York Times* Articles by Year**

Year	Number of Articles	Percent of Total Articles
2017	56	11%
2018	50	10%
2019	55	11%
2020	44	9%
2021	199	40%
2021	92	19%
	<b>496</b>	<b>100%</b>

We used content analysis as our method. Content analysis is “a research technique for the objective, systematic and quantitative description of the manifest content of communication” (Berelson 1952, 18). This method provides a process to code and interpret textual material to make valid inferences. Through content analysis we measure the frequency of media frames in the newspaper articles and assess how often other key concepts, such as equity, are mentioned.

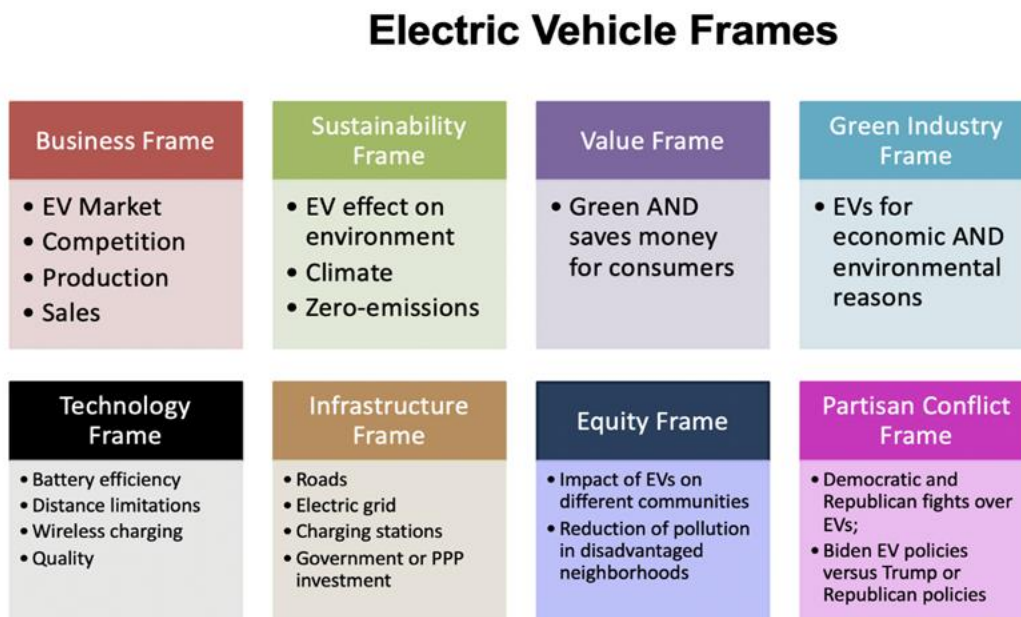
We used the coding protocol developed by Clawson and Lee (2022). See Appendix A for details on the development of the coding protocol. Using a Qualtrics survey, we collected basic information, including the unique identification for each article, the coder, news outlet, article date, article title, and section in which the article was published. The next set of variables required careful reading and analysis of each article. These variables include the frame, whether a U.S. presidential administration (current or past) was mentioned, and whether there were any mentions of equity.<sup>2</sup>

---

<sup>2</sup> We also collected data on the general topic and the country focused on in the article. In this paper, we do not report any results using those two variables.

The framing typology included eight frames: Business, Sustainability, Value, Green Industry, Technology, Infrastructure, Equity, and Partisan Conflict. See Figure 1 for a summary of the phrases and themes used to identify each frame. See Appendix B for quotes illustrating each frame (Clawson and Lee 2022). The core issue of the **Business Frame** is the economics of electric vehicles. The Business Frame focuses on the automotive industry and the role of EVs in it, including the rapid transformation of the automobile industry toward EVs. The story line is about markets, competition, manufacturing, and production of electric vehicles. Marketing and sales figures are often components of this frame. The focus is on the development and production of EVs as a business endeavor. In these stories, industry profit is the primary reason to move toward an electrified transportation future.

**Figure 1. Summary of Phrases and Themes to Identify Electric Vehicle Frames**



There are three frames that touch on the environmental impact of electric vehicles. The core issue of the **Sustainability Frame** is the prioritization of environmental sustainability in the development and deployment of electric vehicles. The Sustainability Frame focuses on electric vehicles as a key way to reduce greenhouse gas emissions, or, in a few articles, questions how green electric vehicles truly are. The story line is about electric vehicles generating zero-emissions in contrast to internal combustion engine vehicles. In these stories, combatting climate change is the primary reason to move toward an electrified transportation future.

Another frame that highlights the environmental impact of EVs focuses on individual consumers. The core issue of the **Value Frame** is whether electric vehicles are a good value in terms of *both* environmental sustainability *and* the long-term cost of the vehicle. Essentially this frame focuses

on whether an electric vehicle is worth it and often addresses the affordability of electric vehicles over its life span. The story line of these articles is that electric vehicles run on green energy that saves consumers money in the long run.

The third frame that highlights the environmental impact of EVs is the **Green Industry Frame**. The core issue of the Green Industry Frame is the pursuit of EVs for both economic and environmental reasons. This frame focuses on the intersection of business interests with government and consumer demand for clean energy. The story line is about the need for industry to change and build greener cars in response to a shifting focus on sustainability. The opportunity for clean energy profit is the primary reason to move toward an electrified transportation future.

The core issue of the **Technology Frame** is the development of the technology associated with electric vehicles. This frame focuses on the development and quality of electric vehicle-related technology, such as batteries, charging stations, and wireless charging capabilities. These stories often allude to distance limitations of EVs and the development of technology to address range anxiety. This frame captures the shift toward viewing car companies as technology companies and compares EV technology to other high-tech or futuristic innovations.

The core issue of the **Infrastructure Frame** is the existence of and investments into electric vehicle infrastructure, such as roads, electric grids, and charging stations. The story line is about what physical infrastructure is needed to support an electrified transportation future. The focus is often on White House proposals, such as tax incentives for electric vehicle adopters, or on government and public-private investment in electric vehicles.

The core issue of the **Partisan Conflict Frame** is the partisan politics surrounding electric vehicles. The story line is about disagreements between Republicans and Democrats on EV adoption and policies. This frame captures discussions of Trump versus Obama or Biden era transportation priorities. These articles focus on ideological policy disputes and culture wars over electric vehicles, such as referring to EV owners as Tesla liberals or Prius liberals.

The core issue of the **Equity Frame** is the inclusion and consideration of disadvantaged and marginalized communities in the development, adoption, and deployment of electric vehicles. The story line is about challenges to achieving transportation equity and the impact of electric vehicles on underserved neighborhoods. This frame captures discussion of how EVs can reduce pollution in disadvantaged communities next to highways.

Because the Equity Frame was not common, we also captured *equity considerations* that were mentioned in the media coverage using a dichotomous measure. When an article mentioned equity in regard to electric vehicles specifically or transportation generally, we coded it as an equity mention. Drawing from the scholarship on EVs and equity, we defined equity broadly to include mentions of disparities in regard to race, income (low and high), rural, urban, workers, affordability, or vulnerable populations or communities. If any of these were mentioned in the

context of electric vehicle adoption or deployment, we coded it as an article that mentioned equity.

Here is a quote to illustrate an equity mention in a news article:

The Biden administration has framed its transportation plans as a once-in-a-generation opportunity to reshape how people get around. Many bridges and highways are reaching the end of their life spans and need to be replaced or overhauled. At the same time, transportation is the nation’s biggest source of greenhouse gas emissions, with electric vehicles slowly taking hold. Communities of color and poorer neighborhoods often suffer from fewer transportation options, limiting access to jobs and health care (“Deal Significantly Boosts Rail and Transit Spending,” *Washington Post*, June 25, 2021).

Finally, given the importance of official news sources in driving media coverage (Bennett 1990; Entman 2005), we noted whether each article included coverage of the current or prior presidential administration.

## RESEARCH FINDINGS

What media frames are used in coverage of electric vehicles? First, we found that the NYT used a wide variety of frames between 2017 and 2022. The Business Frame was most common, yet several other frames appeared in the coverage. Fewer than 10 articles could not be placed within our frame typology. The Equity Frame was rarely used. See Table 2.

**Table 2. Media Frames of Electric Vehicles, 2017-2022**

Frame	Number of Articles	Percent of Total Articles
Business	242	49%
Sustainability	71	14%
Infrastructure	48	10%
Green Industry	40	8%
Technology	34	7%
Partisan Conflict	34	7%
Value	14	3%
Other	9	2%
Equity	4	<1%
	<b>496</b>	<b>100%</b>

Second, the Business Frame structured nearly half of the articles. Forty-nine percent of the 496 articles constructed electric vehicles as an economic issue. These articles conveyed how automotive companies are developing and manufacturing electric vehicles and electrified versions of their existing models. Market competition, EV sales, and investment in U.S.-based

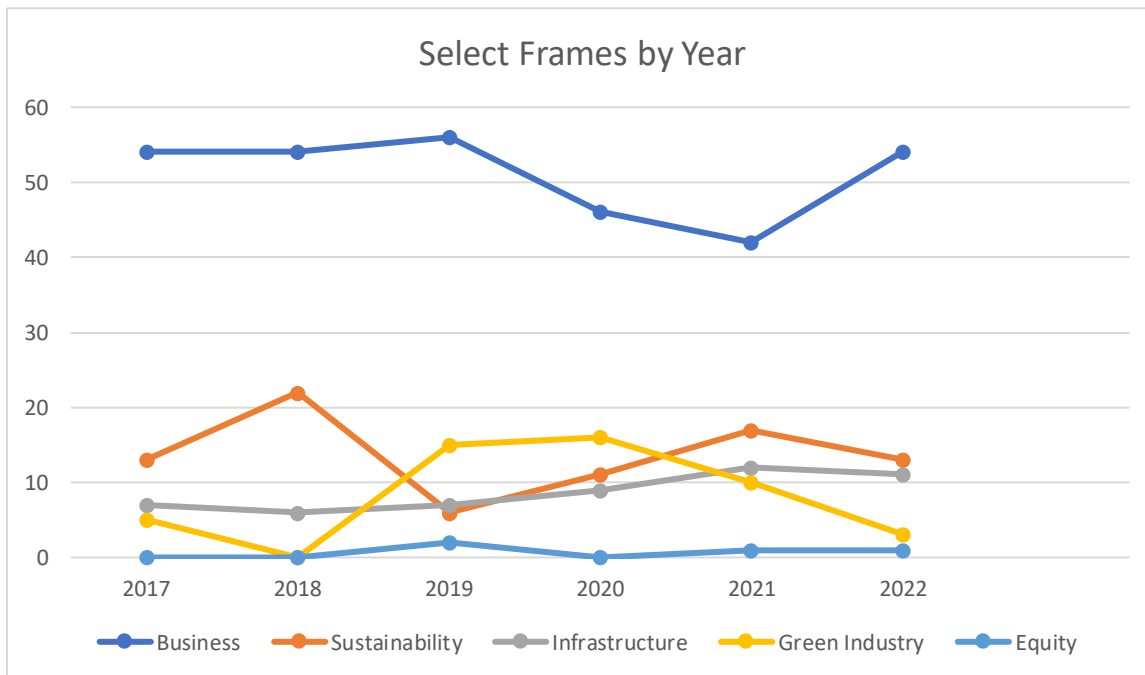
manufacturing of electric vehicles and electric vehicle parts are elements of this story line. Overall, the Business Frame captured how the automotive industry is making transformational changes toward a profitable electric vehicle future.

Here is an excerpt from a 2019 *New York Times* article that conveys the Business Frame:

General Motors is moving to widen its lineup of electric cars, and adding jobs in the process. The automaker said Friday that it would begin producing a new electric vehicle as part of its Chevrolet lineup, resulting in the addition of 400 jobs at its plant in Orion Township, Mich. The vehicle will share some characteristics with the all-electric Chevrolet Bolt EV, a small wagon that is already produced at the Orion factory, the company said in a statement. The addition of the vehicle will be accompanied by an investment in the plant of about \$300 million. The company did not offer any other details about the new vehicle. (“G.M. Adding Electric Car and 400 Jobs in Michigan,” *New York Times*, 2019)

News articles that use the Business Frame convey a “business as usual” approach to the automobile industry even as they describe a radical shift away from internal combustion engine vehicles. In this way, these articles normalize investments in electric cars as smart business decisions. A year-by-year analysis shows that throughout the time period, the business frame consistently received the most attention, including making up more than 50 percent of the coverage in 2017, 2018, 2019, and 2022. See Figure 2. (See Table C.1 in Appendix C for the data on each frame by year.)

**Figure 2: Select Frames by Year**



The Sustainability Frame was the second most common frame with 14 percent of the articles constructing electric vehicles as an issue of environmental sustainability. See Table 2. These articles emphasized electric vehicles as a key way to reduce greenhouse gas emissions, or, in a few articles, questioned how green electric vehicles truly are. The story line was about electric vehicles generating zero-emissions in contrast to internal combustion engines. These articles centered on an electrified transportation future as a primary means to combat climate change. Note that 2018 was the year the Sustainability Frame received the greatest attention with 22 percent of the articles using that frame. See Figure 2.

This quote from the *New York Times* conveys the Sustainability Frame:

Around the world, governments and automakers are promoting electric vehicles as a key technology to curb oil use and fight climate change. General Motors has said it aims to stop selling new gasoline-powered cars and light trucks by 2035 and will pivot to battery-powered models. This week, Volvo said it would move even faster and introduce an all-electric lineup by 2030. . . . Broadly speaking, most electric cars sold today tend to produce significantly fewer planet-warming emissions than most cars fueled with gasoline. But a lot depends on how much coal is being burned to charge up those plug-in vehicles. And electric grids still need to get much, much cleaner before electric vehicles are truly emissions free. (“How Green Are Electric Vehicles?” *New York Times*, 2021).

The Infrastructure Frame was the third most common frame with 10 percent of the articles focused on the physical structures necessary to accommodate electric vehicles. See Table 2. The Infrastructure Frame was more common once President Biden was elected (see Figure 2), and many of the articles focused on Biden’s major initiative to improve existing transportation infrastructure and invest in future infrastructure projects in the United States. Some of these stories mentioned building better infrastructure to make transportation more sustainable or equitable, but the main story line was about improvements to the physical infrastructure itself, including roads, charging stations, and electric grids.

This excerpt from the *New York Times* captures the Infrastructure Frame:

The spending in the plan covers a wide range of physical infrastructure projects, including transportation, broadband, the electric grid and housing; efforts to jump-start advanced manufacturing; and other industries officials see as key to the United States’ growing economic competition with China. . . . It would electrify 20 percent of the nation’s fleet of yellow school buses. (“Biden Details \$2 Trillion Plan to Rebuild Infrastructure and Reshape the Economy,” *New York Times*, 2021)

The fourth most common frame, at 8 percent of the coverage, is environmentally focused from an industry perspective. See Table 1. The Green Industry Frame constructs electric vehicles as both economically *and* environmentally advantageous. These articles emphasize how money can be made from developing and selling electric vehicles to meet government and consumer

demand for clean energy. Electric vehicles represent the automotive industry's initiatives to provide sustainable and profitable automobiles for consumers. The Green Industry frame was most prominent in 2019 and 2020. See Figure 2.

This quote from a 2020 *New York Times* article captures the Green Industry frame:

On Wednesday, at its technical center in Warren, north of Detroit, G.M. laid out a comprehensive strategy to produce a wide array of affordable electric vehicles over the next few years. They range from compact cars to full-size pickup trucks. And unlike Tesla's upscale models, they will be priced to appeal to mainstream consumers, G.M. officials said. . . . "We want to get as many E.V.s on the road as possible," said Mary T. Barra, the G.M. chief executive. "We believe climate change is real, and we have the ability and responsibility to create a cleaner, healthier planet." ("G.M. Lays Out Ambitions for Its Electric Lineup," *New York Times*, 2020)

The Technology Frame and the Partisan Conflict Frame were the next most common frames at 7 percent of the articles each. See Table 2. The story line of the Technology frame focused on the development of technology necessary for the production and adoption of electric vehicles, such as batteries, charging stations, and wireless charging. Some of the stories focused on technology-related issues with electric vehicles currently on the market, and others conveyed the notion that automotive companies are becoming technology companies.

To illustrate the Technology Frame, here is a 2022 quote from the *New York Times*:

Already far behind Asian manufacturers in building electric car batteries, U.S. automakers and their suppliers are racing to develop a new generation of batteries that are cheaper, can pack in more energy and charge faster. It is a global contest with huge economic consequences for automakers, small battery start-ups and car buyers, who in a few years will choose from a dizzying array of electric cars that use different kinds of batteries as the combustion engine era recedes. ("The Race Is On To Control Battery Technology," *New York Times*, 2022).

The Partisan Conflict Frame focused on partisan differences related to electric vehicle development and adoption. The story line was about Republican and Democratic disputes (at the state and federal level) over government investment in electric vehicle-related infrastructure. The Partisan Conflict Frame captured discussion of partisan debates that led to either the enactment or reversal of policies that affect EVs. This frame also sometimes mentioned intra-party disagreements over policies affecting electric vehicles.

To illustrate, here is an example of the Partisan Conflict Frame from the *New York Times* in 2017:

The Trump administration is expected to begin rolling back stringent federal regulations on vehicle pollution that contributes to global warming, according to people familiar with

the matter, essentially marking a U-turn to efforts to force the American auto industry to produce more electric cars. The announcement -- which is expected as soon as Tuesday and will be made jointly by the Environmental Protection Agency administrator, Scott Pruitt, and the transportation secretary, Elaine L. Chao -- will immediately start to undo one of former President Barack Obama's most significant environmental legacies. ("Trump to Begin Undoing Vehicle Pollution Restrictions," *New York Times*, 2017)

The Value Frame is like the Green Industry Frame but from a consumer perspective. It was present in only 3 percent of the articles. See Table 2. These articles construct EVs as the best value if the goals are both sustainability and cost. Some of these articles did explicit cost-benefit analyses of electric vehicles from the consumer point of view. The articles focused on the current price tags of electric vehicles, how they compare to gas vehicles, and whether electric vehicles are truly green alternatives to other transportation options.

Here is an excerpt from a *New York Times* opinion piece that illustrates the Value Frame:

The cost of an electric car can be prohibitive, it's true, or at least it can appear to be from a glance at the window sticker. But we chose a Nissan Leaf, a vehicle made by our neighbors down in Smyrna, Tenn., and the model we bought qualified for the highest possible federal tax credit. So the actual cost of our car was \$7,500 less than the price we paid for it, even if it didn't seem that way when we signed the papers.

Besides the tax credit — which varies from vehicle to vehicle and has already expired on some of the most popular models, including all Teslas — electric cars are less expensive to maintain. A new analysis by the Massachusetts Institute of Technology found that the total cost of ownership is actually lower for many electric vehicles, over the lifetime of the car, than for their combustion engine equivalents. And from an environmental standpoint, there's no comparison at all, even factoring in the higher emissions involved in producing an electric vehicle's giant battery. ("Even for Bargain Hunters, Green Cars Make Sense," *New York Times*, 2021)

Finally, only four *New York Times* articles used the Equity Frame as a story line between 2017 and 2022. See Table 2. Despite the many equity issues around electric vehicles and President Biden's emphasis on transportation equity, the *New York Times* rarely used the inclusion and consideration of disadvantaged and marginalized communities in the development, adoption, and deployment of electric vehicles as a core organizing principle of their articles. See Figure 2 for the year-by-year analysis of the general absence of the Equity Frame.

This quote from a 2022 article in the *New York Times* illustrates an equity frame in an international context:



China produces three-quarters of the world's lithium ion batteries, and almost all the metals needed to make them are processed there. Much of the material, though, is actually mined elsewhere, in places like Argentina, Australia and the Democratic Republic of Congo. Uncomfortable with relying on other countries, the Chinese government has increasingly turned to western China's mineral wealth as a way to shore up scarce supplies. That means companies like the Xinjiang Nonferrous Metal Industry Group are assuming a larger role in the supply chain behind the batteries that power electric vehicles and store renewable energy -- even as China's draconian crackdown on minorities in Xinjiang fuels outrage around the world. (“U.S. Rule Risks Disrupting Global Battery Supply,” *New York Times*, 2022).

Next, we turn to a discussion of how equity *was covered* in the *New York Times* despite the rarity of the Equity Frame. *Equity considerations* were included in the news coverage of electric vehicles between 2017 and 2022. In fact, 32 percent of the news articles mentioned equity issues in some fashion (n = 159). The articles referenced such concerns as racial inequity in transportation investment, effects on vulnerable communities, impacts on workers, EV affordability, air pollution and environmental justice, and differential access to charging stations. See Table 3 for examples of equity considerations. These equity considerations largely mirrored the types of concerns that researchers raised in scholarly literature on EVs and equity.

**Table 3. Examples of Equity Considerations**

<p><b>Race and Class Equity</b></p> <p>“The bill is rooted in the idea that our electric infrastructure should support opportunities for living-wage jobs, work force equity and energy resilience. As chair of the Western Governors' Association, I worked with my fellow governors to expand access to electric vehicles and charging infrastructure across the West, prioritizing rural and low-income areas and communities of color. We have an opportunity right now to get millions of Americans back to work in clean energy jobs, address the climate crisis and center equity in our investments.” (<i>New York Times</i>, “The West is on Fire. It’s Past Time to Act on Climate Change,” 2021)</p>
<p><b>Affordability</b></p> <p>“‘What versions they are producing are almost as important as how many they are producing a week,’ said Rebecca Lindland, a senior analyst at Kelley Blue Book, an automotive research firm. ‘They've been talking about a mainstream car that anybody can afford but what they're making are still luxury cars that most buyers can't afford.’” (<i>New York Times</i>, “Tesla Finds a Saboteur On the Inside,” 2018)</p>

**Impact on Workers**

“A rapid shift by the auto industry could lead to job losses and business failures in related areas. Electric cars don’t have transmissions or need oil changes, meaning conventional service stations will have to retool what they do. Electric vehicles also require fewer workers to make, putting traditional manufacturing jobs at risk.” (*New York Times*, “G.M. Phasing Out Cars and Trucks Using Gas by 2035,” 2021)

**Accessibility**

“Another big concern is charging. People with dedicated parking spots typically charge their E.V.s overnight at home, but many people who live in apartments or have to drive longer distances need to use public charging stations, which are still greatly outnumbered by gas stations.” (*New York Times*, “Biden’s Push for Electric Cars: \$174 Billion, 10 Years and a Bit of Luck,” 2021)

**Air Pollution**

“The oldest and dirtiest diesel trucks are concentrated in urban areas around ports, industrial warehouses and freeways near low-income communities, making this an important environmental justice concern. A study by the Environmental Defense Fund found that eliminating pollution from freight trucks in urban areas and other communities by 2035 and from all new trucks and buses by 2040 could prevent 57,000 premature deaths by 2050.” (*New York Times*, “Carbon-spewing Vehicles Must Be Stopped,” 2022)

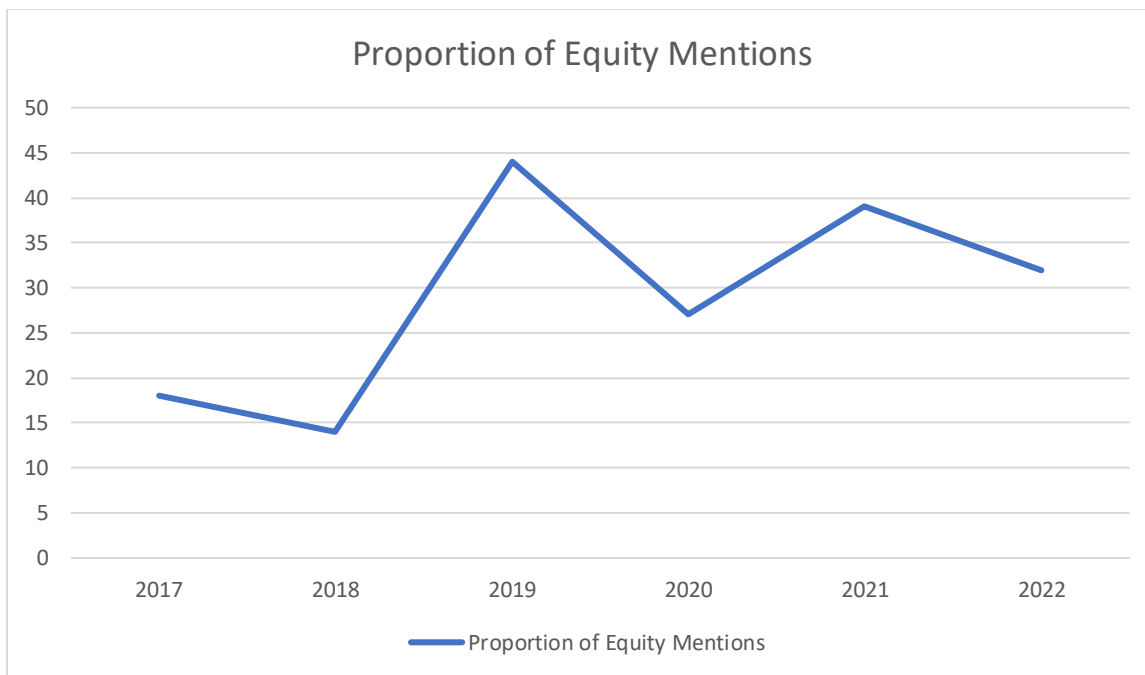
**Vulnerable Communities**

“As for cobalt, it comes primarily from the Democratic Republic of Congo, one of the world's most war-torn and unstable countries. Illegal mining operations there have been accused of using child labor.” (*New York Times*, “What’s Stalling Electric Cars,” 2017)

As these quotes illustrate, these articles highlight a range of equity concerns about government investment in transportation and clean energy, government regulations of EVs, the impact of dramatic changes in the automotive industry on workers, mining and child labor, pollution, and the affordability and accessibility of electric vehicles. Thus, our results show that equity was an important consideration in about one-third of the articles, but significantly, equity was rarely a story line that structured media coverage of electric vehicles.

A year-by-year analysis shows that equity considerations were fairly uncommon in 2017 and 2018, peaked in 2019 with 44 percent of the articles addressing equity, and bounced around between 27 and 39 percent between 2020 and 2022. See Figure 3. We expected the media to dedicate greater attention to equity once President Biden took office given his administration’s Justice40 initiative. Attention to equity is essentially double during the Biden administration than in 2017 and 2018, yet it is notable that equity received the most attention during 2019 while President Trump was in office. Further exploration is needed to understand if there were specific political events leading to this attention to equity considerations in 2019. It’s possible that conflicts between the Trump administration and California over auto emissions and fuel economy regulations are driving some of the attention to equity.

**Figure 3. Proportion of Equity Mentions in *New York Times* Articles by Year**



We further explored the impact of President Biden’s emphasis on equity on the coverage given the important role official sources play in shaping media coverage (Bennett 1990; Entman 2005). We examined whether the Biden administration’s linkage of equity with climate change and infrastructure was captured in the media coverage of electric vehicles. Specifically, we examined whether equity considerations were more likely to be mentioned in EV articles that also mentioned the presidential administration during the Biden administration than during the Trump administration. Between 2017 and 2020 during the Trump presidency, there was no

relationship between mentions of equity and the presidential administration (Pearson's  $r = .03$ ). In contrast, in 2021 and 2022 with Biden in power, there was a relationship between equity mentions and mentions of the presidential administration (Pearson's  $r = .20$ ). This suggests that President Biden's rhetoric on equity and environmental justice was picked up by the *New York Times* and helped shape its coverage of electric vehicles.

We found that Biden and equity concerns were linked in articles on Biden's legislative agenda. One *New York Times* article, for example, focused on Senator Sinema's opposition to the amount of spending on climate programs proposed by the Biden administration. The article described programs that were likely to be cut due to her opposition:

. . . a number of programs designed to help poor people adapt to the destructive impacts of climate change, as well as \$30 billion for a "Green Bank" to help communities finance construction of solar panels and electric vehicle charging stations, and \$30 billion to create a "Civilian Climate Corps" that would hire young adults to work in climate mitigation and adaptation, with half coming from communities of color. Another possible contender for the chopping block could be a \$10 billion program to help rural electric cooperatives, which supply electricity to over 40 million people in rural communities. The money would aim to ease the price spikes that those rural residents could see in their power bills as the cooperatives make the switch from buying coal-fired power to wind and solar. Other potential cuts could include a \$13 billion program to build new electric vehicle charging stations -- including \$1 billion to ensure that those stations are built in lower-income areas. "Absent programs like that, the economic transition to different energy sources will be less even and equitable," Mr. Coequyt said. "There will be communities that can't take advantage of the new technologies for a whole bunch of different reasons." ("Sinema Is Said to Want \$100 Billion Cut From Climate Plans," *New York Times*, 2021).

This quote nicely captures EV equity considerations concerning communities of color, young adults, rural communities, and lower-income areas and shows how the discussion was connected to Biden's legislative proposals.

## **DISCUSSION AND CONCLUSION**

Here we have provided an in-depth analysis of EV media frames in the *New York Times* between 2017 and 2022. We found that the NYT uses a number of frames to construct the issue of electric vehicles. These frames included Business, Infrastructure, Sustainability, Partisan Conflict, Technology, Green Industry, Value, and Equity. The Business Frame was the most common with nearly one-half of the articles articulating EVs as an economic issue.

The Business Frame normalizes electric vehicles, which most likely encourages positive attitudes toward EVs and EV adoption. These stories discuss EVs as a business endeavor in the same way they might discuss vehicles with internal combustion engines. There are some references to how

we are in the midst of a major transportation transformation, but the story line is primarily focused on mundane business concerns of competition, markets, investment, production, and sales.

The Sustainability Frame was also a key driver of the coverage. Fourteen percent of the stories constructed EVs as an important element in the fight to reduce greenhouse gas emissions, or in a few instances, challenged that assertion. Environmental considerations were also part of the Green Industry and Value frames. Although these frames were two of the less common frames (at 8 percent and 3 percent, respectively), they nevertheless provided a compelling narrative that the move to electric vehicles is smart due to the economic *and* environmental benefits of EVs for the corporate world and for individual consumers. Together these three environmental-related frames represent 25 percent of the articles. Thus, rhetoric about the role of EVs in creating a sustainable transportation future made up a meaningful portion of the coverage.

The Infrastructure Frame was the third most common frame at 10%. Its prominence was largely due to the many stories centered on President Biden's infrastructure initiative. These stories are important to potentially alleviate consumers' concerns about range anxiety and the availability of charging stations. A 2020 survey by Consumer Reports, for example, showed that "not enough public charging stations" was the most common reason provided for what was holding people back from buying an electric vehicle ("Consumer Interest" 2020, 7). The Infrastructure Frame conveys the investment the U.S. government is making in an electrified transportation future.

The Technology Frame received only 7 percent of the coverage. These stories focused on the technological aspects of batteries and charging. Technological developments are certainly necessary for widespread adoption and deployment of EVs, but the *New York Times* dedicated limited coverage to such a frame.

The politics around electric vehicles are not as polarized as the politics of many other issues. That is good news for proponents of electric vehicles. Only seven percent of the EV articles are constructed with a Partisan Conflict story line, demonstrating that party debates about EV policy are not a particularly common frame. If Republican elites were to prioritize electric vehicles as an issue at the core of an individual's partisan identity in the same way they have COVID mask mandates and vaccines for example, it could greatly increase the media's use of this Partisan Conflict frame, which would not bode well for the widespread adoption of electric vehicles. The business case for EVs as represented in the Business Frame as well as in the Green Industry and Value frames may deter Republican elites from weaponizing electric vehicles as a partisan issue. Documenting whether and how the prominence of the Partisan Conflict frame changes over time will be very important for understanding the political context of EV adoption.

The rarity of the Equity Frame between 2017 and 2022 was striking, especially given the Biden administration's push on sustainable and equitable infrastructure in 2021 and 2022. Traditional media outlets, however, are not particularly good at addressing systemic issues in their coverage

of social issues (Iyengar 1991). Thus, the downplaying of equity issues is consistent with mainstream news coverage in general and thus perhaps not that remarkable after all.

Still, 32 percent of the articles at least mentioned some aspect of equity, and we view that coverage as quite important even if it did not rise to the level of a frame. The *New York Times* articles drew attention to such concerns as racial inequities in transportation investments, the impact of EVs on workers, air pollution disparities, the affordability and accessibility of EVs, and injustices around mining. Moreover, our analysis suggests President Biden's rhetoric was able to direct attention to equity considerations because his administration was regularly referenced in the stories with equity mentions during 2021 and 2022.

One critical question that our study raises is how the coverage of equity considerations might influence public attitudes on electric vehicles. A recent study on COVID and racial disparities offers a tantalizing, and distressing, insight that we think might be relevant for electric vehicles (Skinner-Korkenoo et al. 2022). Using an experimental manipulation, Skinner-Korkenoo et al. (2022) demonstrate that whites who read a news article about racial disparities in COVID-19 were less fearful of COVID-19 and were less supportive of safety precautions than those exposed to a control message that focused on infections in the general population. This is a troubling finding. As the authors aptly note, "publicizing COVID-19 racial disparities could reduce support for the very policies that aim to limit the toll of the pandemic, creating a vicious cycle wherein raising awareness of systemic racial health disparities results in public responses that actually exacerbate these disparities" (Skinner-Korkenoo et al. 2022, 7). If whites were to react similarly to news coverage of EV equity considerations, particularly considerations that focus on racial inequities, it would greatly undermine the push toward a sustainable and equitable transportation future.

In conclusion, this study provides an important baseline as we move toward an increasingly electrified transportation future. Further research is needed to understand whether the most common frames will change over time, whether equity considerations will become more or less prominent in response to the broader political context, and how traditional news media coverage compares with social media posts. We have discussed the possible implications of this media coverage for adoption of electric vehicles. In future research, we intend to explore this further by conducting an experiment to investigate the impact of media frames on public opinion toward electric vehicles and behavioral intentions to buy an electric vehicle as well as investigate the influence of media coverage of equity considerations on public opinion.

## **APPENDIX A: CLAWSON AND LEE (2022) CODING PROTOCOL DEVELOPMENT**

For Clawson and Lee's (2022) initial research, three coders read a subset of articles published between January 1, 2021 and June 30, 2021 in the *New York Times* to develop the coding sheet. Using a Qualtrics survey, they collected several variables, including the unique identification for each article, the coder, news outlet, article date, article title, section in which the article was published, the frame, whether a U.S. presidential administration (current or past) was mentioned, and whether there were any mentions of equity.

Based on reading a subset of articles and their assessment of elite rhetoric surrounding electric vehicles, Clawson and Lee (2022) developed a typology of frames. Through an iterative and collaborative process, they defined each frame and specified certain phrases and themes as indicators of a frame. Because the article was the unit of analysis, they focused on capturing the overall story line for each article in the coding. Elements of various frames were often present in a single article, yet their goal was to qualitatively identify the dominant construction of the issue in each article. To do this, they paid close attention to the title, the opening paragraph, and the language around the mentions of electric vehicles.

They ensured each coder had a conceptual understanding of each frame before they began coding. At that point, they coded a small set of articles, compared results, and then again engaged in an iterative process to calibrate the coding and adjusted the coding sheet accordingly. Once they achieve a high level of intercoder reliability, two coders coded all the electric vehicle-centric articles from two national papers and five local newspapers published between January 1, 2021 and June 30, 2021. When there were disagreements, the coders discussed the conflict and resolved it. In this paper, we use their January-June 2021 *New York Times* data and add to it by collecting NYT data from 2017-2020, July-December 2021, and 2022.

## **APPENDIX B: FRAME EXAMPLES**

### **Business Frame**

“Two South Korean industrial giants have reached a last-minute global settlement that will allow a pair of new plants in Commerce, Ga., to move ahead with plans to supply batteries for Ford and Volkswagen electric vehicles, according to people familiar with the negotiations. The deal will be a victory for President Biden, who has been eager to create jobs, build a U.S.-based supply chain for electric vehicles and move toward slowing climate change -all without taking sides in a dispute between the firms over intellectual property. SK Innovation can now complete construction of its \$2.6 billion manufacturing facilities, which will employ 1,000 workers by the end of this year. By 2024, the plants will have 2,600 workers and churn out lithium-ion batteries for more than 300,000 electric vehicles annually, mostly for Ford and VW brands.” (“Korean battery makers reach agreement for U.S. factories,” *Washington Post*, 2021)

### **Sustainability Frame**

“As part of the effort to reduce emissions from cars on the road, the city aims to have 300 publicly available electric vehicle charging stations by 2025. However, the number of available stations fell by 18 since they were last counted in 2018, to 172 available in 2020. In hopes of encouraging Indianapolis residents to consider electric vehicles, the sustainability office's Knozone air quality initiative launched a campaign this spring called Highly EVolved, which will include advertisements, a website and informational webinars. Although the number of charging stations decreased in the last two years, the number of electric vehicles registered in Marion County actually tripled in the same time. Just under 400 electric vehicles were registered in 2017, and 1,058 were registered in 2020. The target laid out in the Thrive plan is 3,040 by 2025.” (*Indianapolis Star*, “9 ways the city has progressed,” 2021)

### **Value Frame**

“With new electric vehicle prices hitting more than \$30,000 for cars like the Chevrolet Bolt, Nissan Leaf and Hyundai Ioniq, some buyers are turning to the used channel to find a gas-free car at a more affordable price. There, they often find they can save significant dollars because the residual values of electric vehicles traditionally decrease more than the average internal combustion engine-powered vehicle. The vehicles typically have older technology and don't benefit from a federal subsidy offered to new buyers. EVs also require less maintenance like no oil changes, and they have fewer parts, so care by prior owners may be less of an issue -- though battery longevity is an additional consideration. Of course, that's if buyers are able to find a used EV of interest in a fleet that for now remains comparatively limited. . . . It's a different buyer, they are just more concerned with gas mileage, a little more concerned with air pollution, and cost of gas is one of the big motivating factors.” (*Chicago Tribune*, “Electric car buyers save,” 2021)

### **Green Industry Frame**



“G.M.'s announcement gives powerful political momentum to that plan, signaling that the nation's biggest automaker supports the administration's single largest policy to fight climate change. In October, G.M. unveiled a Hummer electric pickup truck, and within a day it had collected enough orders to account for all the trucks G.M. planned to make in the truck's first year. That was another inflection point," Mr. Parker, the chief sustainability officer, said. "It showed consumers really are very excited about owning electric vehicles." (*New York Times*, “G.M. Decision To Go Electric Rocks Industry,” 2021)

### **Technology Frame**

“These “ground up” procedures involve collaboration between suppliers and manufacturers, Mr. Coke said. They must consider the brakes, the wheels, the side mirrors, wind noise, chassis noise, tire noise. The issues are not unique to one manufacturer; in his case, Pirelli, whose home base is Milan, has been working closely with Rivian, which is based in Michigan, to fit tires to its products. Tires, of course, are Mr. Coke’s singular concern. And among his priorities in developing for E.V.s is reducing a tire’s rolling resistance, a key factor in extending battery life. Longer battery life means less range anxiety, and a bigger potential market for electric cars.” (*New York Times*, “E.V.s Force Carmakers to Reinvent the Wheel, and Brakes, and Mirrors ...; Wheels,” 2021)

### **Infrastructure Frame**

“President Biden launched a bold effort Wednesday to reshape American life by repairing roads, installing electric car charging stations, renovating schools, expanding broadband connectivity and much more -- a vision, he said, "not seen through the eyes of Wall Street and Washington, but the eyes of hardworking people." The ambitious proposal, with a price tag exceeding \$2 trillion over eight years, reflects Biden's belief that the country is ready for the federal government to play a larger role in providing for its citizens, tackling climate change and modernizing its public works, recalling expansive Democratic initiatives during the New Deal and the Great Society eras. "It's not a plan that tinkers around the edges," Biden said at a carpenters training center in Pittsburgh. "It's a once-in-a-generation investment in America, unlike anything we've seen or done since we built the interstate highway system, and the space race, decades ago." (*Los Angeles Times*, “Biden unveils plan to reshape infrastructure; His \$2-trillion-plus plan targets neglected public works, climate change and gaps in the U.S. social safety net,” 2021)

### **Partisan Conflict Frame**

“Republicans have pooh-poohed President Biden's request for funding for EV subsidies and charging stations in an infrastructure package, with Senate Minority Leader Mitch McConnell (R-Ky.) suggesting the initiative is wasteful and part of a "liberal wish-list." Worse than withholding funds to accelerate electric-vehicle adoption, Republican officials push policies that could slow it down. They've argued, for instance, that any infrastructure package should be funded through new fees or taxes on electric vehicles -policies that would diminish the financial

benefits of going electric. . . . Maybe Republicans are operating off of decades-old facts and have yet to update their understanding of how cheap and therefore economically attractive renewables have become. Or maybe it's just more politically useful to treat green energy as a cultural wedge issue, akin to guns. The Lightning -and other fast, cool, affordable products attractive to conservative and liberal customers alike -will make this strategy harder to sustain.” (*Washington Post*, “There's something 'bout a (electric) truck,” 2021)

### **Equity Frame**

“In the backyard of California’s Capitol sits Franklin Boulevard, a largely industrial area where many residents earn a living keeping old vehicles on the road. The state, which has been aggressively pushing toward an electric-car future, has made few such inroads in this working-class neighborhood. ‘Electric vehicles are for the rich. It’s not for us,’ said Mike Bokan, who owns an auto-repair shop on Franklin Boulevard, explaining a prevailing attitude. The median income here is \$30,000.” (*New York Times*, “Electric Cars for the Masses? One City Is Trying,” 2019)

## APPENDIX C

**Table C.1: Proportion of Frames by Year**

<b>Frame</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Business	54	54	56	46	42	54
Sustainability	13	22	6	11	17	13
Infrastructure	7	6	7	9	12	11
Green Industry	5	0	15	16	10	3
Technology	5	8	9	11	6	7
Partisan Conflict	13	6	6	7	7	5
Value	4	4	0	0	4	2
Other	0	0	0	0	3	3
Equity	0	0	2	0	1	1

Note: Table entries are the percentage of articles for each frame out of the total number of articles.

## REFERENCES

- Al-Qadi, Dana. 2021. "Equitable Transportation and Electrification." *AECOM*.  
<https://publications.aecom.com/transportation-electrification/article/equitable-transportation-electrification>.
- Bennett, W. Lance. 1990. "Toward a Theory of Press-State Relations in the United States." *Political Communication* 40:103-125.
- Berelson, Bernard R. 1952. *Content Analysis in Communications Research*. New York: Free Press.
- Bipartisan Infrastructure Law. 2022. Federal Transit Administration. Department of Transportation. <https://www.transit.dot.gov/BIL> (accessed April 1, 2022).
- Boehmer, Tegan, Stephanie Foster, Jeffery Henry, Efomo Woghiren-Akinnifesi, and Fuyuen Yip. 2013. "Residential Proximity to Major Highways – United States 2010." *Center for Disease Control and Prevention*, November 22.  
<https://www.cdc.gov/mmwr/preview/mmwrhtml/su6203a8.htm>.
- Broadbent, Gail Helen, Thomas Oliver Wiedmann, and Graciela Isabel Metternicht. 2021. "Electric Vehicle Uptake: Understanding the Print Media's Role in Changing Attitudes and Perceptions." *World Electric Vehicle Journal* 12: 174.  
<https://doi.org/10.3390/wevj12040174>.
- Brockway, Anna M., Jennifer Conde, and Duncan Callaway. 2021. "Inequitable access to distributed energy resources due to grid infrastructure limits in California." *Nature Energy* 6(9):892-903. <https://www.nature.com/articles/s41560-021-00887-6.pdf>.
- Car and Driver. 2022. "Every Electric Vehicle That's Expected in the Next Five Years." January 6. <https://www.caranddriver.com/news/g29994375/future-electric-cars-trucks/> (accessed March 20, 2022).
- Caulfield, Brian, Dylan Furszyfer, Agnieszka Stefaniec, and Aoife Foley. 2022. "Measuring the Equity Impacts of Government Subsidies for Electric Vehicles." *Energy* 248: 123588.  
<https://doi.org/10.1016/j.energy.2022.123588>.
- Clawson, Rosalee A., and Andie Lee. 2022. "Framing of Electric Vehicles in the U.S. Media: Is Equity a Frame or Just a Consideration?" Paper presented at the annual meeting of the Midwest Political Science Association.
- Clifford, Catherine. 2022. "Electric Vehicles Dominated Super Bowl Ads, But Are Still Only 9% of Passenger Car Sales." February 14. <https://www.cnbc.com/2022/02/14/evs-dominated-super-bowl-ads-but-only-9percent-of-passenger-car-sales.html> (accessed February 14, 2022).

- “Consumer Interest and Knowledge of Electric Vehicles.” 2020. Consumer Reports. December. <https://advocacy.consumerreports.org/wp-content/uploads/2020/12/CR-National-EV-Survey-December-2020-2.pdf> (accessed June 3, 2022).
- Diaz, Clarisa. 2023. “1 in 7 Cars Sold Globally Now is Electric.” March 10. World Economic Forum. <https://www.weforum.org/agenda/2023/03/ev-car-sales-energy-environment-gas/> (accessed March 30, 2023).
- Druckman, James N. 2001. “On the Limits of Framing Effects: Who Can Frame?” *Journal of Politics* 63:1041-1066.
- Electric Vehicles and Hybrids Surpass 10% of U.S. Light-Duty Vehicle Sales. 2022. U.S. Energy Information Administration. February 9. <https://www.eia.gov/todayinenergy/detail.php?id=51218> (accessed March 31, 2022).
- Entman, Robert M. 1993. “Framing: Toward Clarification of a Fractured Paradigm.” *Journal of Communication* 43:51-58.
- Entman, Robert M. 2005. “The Nature and Sources of News.” In *The Press*, ed. Geneva Overholser and Kathleen Hall Jamieson. Oxford: Oxford University Press.
- Exec. Order No. 14008, 86 Fed. Reg. 7619 (February 1, 2021). <https://www.regulations.gov/document/EPA-HQ-OPPT-2021-0202-0012> (accessed March 31, 2022).
- Gamson, William A., and Katherine E. Lasch. 1983. “The Political Culture of Social Welfare Policy.” In *Evaluating the Welfare State*, ed. Shimon E. Spiro and Ephraim Yuchtman-Yaar. New York: Academic.
- Gamson, William A., and Andre Modigliani. 1987. “The Changing Culture of Affirmative Action.” In *Research in Political Sociology*, vol. 3, ed. Richard D. Braungart. Greenwich, CT: JAI Press.
- Guo, Shuocheng, and Eleftheria Kontou. 2021. “Disparities and Equity Issues in Electric Vehicles Rebate Allocation.” *Energy Policy* 154. <https://doi.org/10.1016/j.enpol.2021.112291>.
- Henderson, Jason. 2020. “EVs Are Not the Answer: A Mobility Justice Critique of Electric Vehicle Transitions.” *Annals of the American Association of Geographers* 110(96):1993-2010. <https://doi.org/10.1080/24694452.2020.1744422>.
- The Hill. August 20, 2021. *Marjorie Taylor Greene Rallies AGAINST Electric Vehicles* [Video]. Youtube.com. <https://www.youtube.com/watch?v=gum1rqbyITU> (accessed March 31, 2022).
- Iyengar, Shanto. 1991. *Is Anyone Responsible?* Chicago: University of Chicago Press.

- Ju, Yang., Lara J. Cushin, Rachel Morello-Frosch. 2020. "An Equity Analysis of Clean Vehicle Rebate Programs in California." *Climatic Change* 162(4): 2087-2105. <https://doi.org/10.1007/s10584-020-02836-w>.
- Justice40 Initiative, Department of Transportation. <https://www.transportation.gov/equity-Justice40> (accessed March 20, 2022).
- Ku, Arthur L., and John D. Graham. 2022. "Is California's Electric Vehicle Rebate Regressive? A Distributional Analysis." *Journal of Benefit-Cost Analysis* 13(1):1-19. [file:///C:/Users/wtyle/OneDrive/Desktop/Annotated%20Bibliography\(1-5\)/is-californias-electric-vehicle-rebate-regressive-a-distributional-analysis\\_Ku%20and%20Graham.pdf](file:///C:/Users/wtyle/OneDrive/Desktop/Annotated%20Bibliography(1-5)/is-californias-electric-vehicle-rebate-regressive-a-distributional-analysis_Ku%20and%20Graham.pdf)
- Kumar, Rajeev Ranjan, and Kumar Alok. 2020. "Adoption of Electric Vehicle: A Literature Review and Prospects for Sustainability." *Journal of Cleaner Production* 253: 1-21.
- Lee, Rachel, and Solomon Brown. 2021. "Social and Locational Impacts on Electric Vehicle Ownership and Charging Profiles." *Energy Reports* 7(2): 42-48. <https://www.sciencedirect.com/science/article/pii/S2352484721001554>
- Lui, Haobing, Ziyi Dai, Michael O. Rodgers, and Randall Guensler. 2022. "Equity Issues Associated with U.S. Plug-In Electric Vehicle Income Tax Credits." *Transportation Research Part D- Transport and Environment* 102. <https://doi.org/10.1016/j.trd.2021.103159>.
- Mandel, Kyla. 2023. "Where Were All the Car Ads at This Year's Super Bowl?" February 14. <https://time.com/6255332/super-bowl-electric-vehicle-ads-2023/> (accessed March 30, 2023).
- Mulvaney, Dustin. 2017. Identifying the roots of Green Civil War over utility scale solar energy projects on public lands across the American Southwest. *Journal of Land Use Science* 12(6): 493-515. <https://doi.org/10.1080/1747423X.2017.1379566>
- Nelson, Thomas E., Rosalee A. Clawson, and Zoe M. Oxley. 1997. "Media Framing of a Civil Liberties Conflict and Its Effect on Tolerance." *American Political Science Review* 91(3): 567-583.
- Nelson, Thomas E., and Donald R. Kinder. 1996. "Issue Frames and Group-Centrism in American Public Opinion." *Journal of Politics* 58(4):1055-1078.
- Penn, Alexandra S., Suzanne E. Bartington, Sarah J. Moller, Ian Hamilton, James G. Levine, Kirstie Hatcher, and Nigel Gilbert. 2022. "Adopting a Whole Systems Approach to Transport Decarbonisation, Air Quality and Health: An Online Participatory Systems Mapping Case Study in the UK." *Atmosphere* 13(3):492. <https://www.mdpi.com/2073-4433/13/3/492>.

- Prindle, Lee. 2021. "Top States for Electric Vehicles." *Quote Wizard*  
<https://quotewizard.com/news/posts/top-states-for-electric-vehicle-infrastructure#:~:text=The%20national%20rate%20of%20EV,have%20the%20highest%20adoption%20rates> (accessed June 6, 2022).
- Pyddoke, Roger, Jan-Erik Swardh, Staffan Alger, Shiva Habibi, and Noor Sedehi Zadeh. 2021. "Distributional Effects from Policies for Reduced CO<sub>2</sub>-Emissions from Car Use in 2030." *Transportation Research Part D- Transport and Environment* 101: 103077.  
<https://doi.org/10.1016/j.trd.2021.103077>.
- Root, Al. 2021. "EVs Are Taking Over. The Invasion Arrives in the U.S. in 2022." *Barron's*. December 15. <https://www.barrons.com/articles/ev-invasion-arrives-in-the-us-in-2022-51639514589?tesla=y> (accessed March 20, 2022).
- Ruan, Tao, and Qin Lv. 2022. "Public Perception of Electric Vehicles on Reddit Over the Past Decade." *Communications in Transportation Research* 2: 100070.  
<https://doi.org/10.1016/j.commtr.2022.100070>.
- Schwartz, Ian. 2021. "Watch: Rep. Marjorie Taylor Greene Blows Up Car With 'Socialism' Written On It In New Campaign Ad." *RealClear Politics*. September 21.  
[https://www.realclearpolitics.com/video/2021/09/21/watch\\_rep\\_marjorie\\_taylor\\_greene\\_blow\\_up\\_car\\_with\\_socialism\\_written\\_on\\_it\\_in\\_new\\_campaign\\_ad.html](https://www.realclearpolitics.com/video/2021/09/21/watch_rep_marjorie_taylor_greene_blow_up_car_with_socialism_written_on_it_in_new_campaign_ad.html) (accessed March 31, 2022).
- Sintov, Nicole D., Victoria Abou-Ghalioum, and Lee V. White. 2020. "The Partisan Politics of Low-carbon Transport: Why Democrats Are More Likely to Adopt Electric Vehicles Than Republicans in the United States." *Energy Research & Social Science* 68, 101576.  
<https://doi.org/10.1016/j.erss.2020.101576>.
- Skinner-Dorkenoo, Allison L., Apoorva Sarmal, Kasheena G. Rogbeer, Chloe J. André, Bhumi Patel, and Leah Cha. 2022. "Highlighting COVID-19 Racial Disparities Can Reduce Support for Safety Precautions Among White U.S. Residents." *Social Science & Medicine* 301: 1-8. <https://doi.org/10.1016/j.socscimed.2022.114951>.
- Slothuus, Rune, and Claes H. de Vreese. 2010. "Political Parties, Motivated Reasoning, and Issue Framing Effects." *Journal of Politics* 72(3):630-645.
- Sovacool, Benjamin K., Johannes Kester, Lance Noel, and Gerardo Zarazua de Rubens. 2019. "Energy Injustice and Nordic Electric Mobility: Inequality, Elitism, and Externalities in the Electrification of Vehicle-to-Grid (V2G) Transport." *Ecological Economics* 157: 205-217. <https://doi.org/10.1016/j.ecolecon.2018.11.013>.
- Sovacool, Benjamin K., Andrew Hook, Mari Martiskainen, Andrea Brock, and Bruno Turnheim. 2020. "The Decarbonisation Divide: Contextualizing Landscapes of Low-Carbon

- Exploitation and Toxicity in Africa.” *Global and Environmental Change-Human and Policy Dimensions* 60:102028. <https://doi.org/10.1016/j.gloenvcha.2019.102028>
- Spencer, Alison, and Cary Funk. 2021. “Electric Vehicles Get Mixed Reception from American Consumers.” Pew Research Center, Washington, D.C. June 3. <https://www.pewresearch.org/fact-tank/2021/06/03/electric-vehicles-get-mixed-reception-from-american-consumers/> (accessed March 20, 2022).
- Tessum, Christopher W., David A. Paoella, Sarah E. Chambliss, Josha S. Apte, Jason D. Hill, and Julian D. Marshall. 2021. “PM<sub>2.5</sub> Polluters Disproportionately and Systemically Affect People of Color in the United States.” *Science Advances* 7(18): 7.
- van Bommel, Natascha, and Johanna I. Hoffken. 2021. Energy justice within, between and beyond European community energy initiatives: A review. *Energy Research and Social Science* 79: 102157. <https://doi.org/10.1016/j.erss.2021.102157>.
- Vidyattama, Yogi, Robert Tanton, and Hitomi Nakanishi. 2021. “Investigating Australian Household’s Vehicle Ownership and its Relationship with Emission Tax Policy Options.” *Transport Policy* 114:196-205. <https://doi.org/10.1016/j.tranpol.2021.09.017>.
- Zhou, Yirong, Xiaoyue Cathy Liu, Ran Wei, and Aaron Golub. 2021. “Bi-Objective Optimization for Battery Electric Bus Deployment Considering Cost and Environmental Equity.” *IEEE Transactions on Intelligent Transportation Systems* 22(4): 2487-2497. <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9310704&tag=1>.
- Zhu, Shupeng, Michael MacKinnon, James Soukup, Andre Paradise, Donald Dabdub, and Scott Samuelsen. 2022. “Assessment of the Greenhouse Gas, Episodic Air Quality and Public Health Benefits of Fuel Cell Electrification of a Major Port Complex.” *Atmospheric Environment* 275: 118996. <https://doi.org/10.1016/j.atmosenv.2022.118996>.