

WORKING PAPER

Next stop, access! An exploratory paper on disability rights and justice throughout the transition to electric school buses

Justice Shorter, Valerie Novack, and Alyssa Curran

CONTENTS

Executive summary	2
Introduction	3
Background	4
Methodology	7
Research findings	9
Discussion	16
Recommendations	16
Conclusion	17
Appendices	19
Endnotes	26
References	27
Acknowledgments	31

Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues.

Suggested Citation: Shorter, J., V. Novack, and A. Curran. 2024. "Next stop, access! An exploratory paper on disability rights and justice throughout the transition to electric school buses." Working Paper. Washington, DC: World Resources Institute. Available online at doi.org/10.46830/wriwp.23.00046.

DEDICATION | *This working paper is dedicated to students and youth with disabilities. May each reader receive and reflect on this research in loving memory of all the disabled lives lost because of inaccessible and unsafe transit systems. May this work inform and ignite our collective imaginings of more equitable transportation. May it contribute to ongoing initiatives devoted to the creation of safety, dignity, and belonging of every student with a disability. We hope the following pages propel policies and practices toward advocacy efforts that prioritize the leadership and needs of diverse students with disabilities throughout all phases of the transition to electric school buses.*

HIGHLIGHTS

- This Electric School Bus (ESB) Initiative working paper gathers and analyzes literature and qualitative responses from students, youth, parents, and professionals from stakeholder groups across the ESB transition.
- Student and youth participants in the study described how the transition to ESBs cannot be fully realized without the meaningful inclusion of students with disabilities and their families throughout all phases of planning, implementation, and future adjustments of school transportation programs. They also emphasized the need for all school buses to be accessible.
- The transition to ESBs has the potential to either expand transportation equity for people with disabilities or replicate preexisting transportation barriers, which currently offer narrow accommodation options for diverse bodies and minds, pose safety challenges, and restrict mobility access.
- Key recommendations include consulting with disabled youth during transition efforts, prioritizing accessibility measures, addressing design problems, and strengthening accountability measures for legal compliance with disability laws.
- This study also identified several key gaps in data that would help provide a more complete picture of school transportation access for disabled students.

EXECUTIVE SUMMARY

About this working paper

This working paper is powered by diverse perspectives and priorities from across communities of disability, transportation, and environmental justice advocates. With a focus on disability rights and justice, this paper examines the ways students and adults with disabilities are impacted by the electrification of school buses and shares their recommendations for designing a transition that achieves equity and accessibility. Critical research areas posed in this paper include but are not limited to the following:

- Disability-specific challenges and benefits of electrifying school bus fleets
- Availability and accessibility of school bus design features
- Health implications of electrifying school bus fleets
- Multipurpose school bus usage outside of standard school activities
- Geographic factors

Moreover, this paper strives to acknowledge past and present-day harms caused by intersectional transportation inequities, center those who could be most impacted, and amplify solutions that steer us toward a more equitable future. It finds that the transition to ESBs must be driven by equity and accessibility.

Key findings

Researchers gathered data and perspectives from 24 participants using surveys, interviews, facilitated discussions, and public records reviews. Participants included students and other youth (9), advocates (3), school bus manufacturers and dealers (2), government officials (2), school district staff (3), attorneys (3), a researcher (1), and a transit union representative (1) (Appendix A).

Research participants conveyed challenges related to infrastructure, the environment, and accessibility that pervade present-day school transit programs:

- Unreliable school bus ramps and lifts
- Sensory overstimulation from diesel buses
- Safety risks caused by untrained bus drivers and monitors
- Inconsistent compliance with state and federal disability laws
- Unsafe or absent infrastructure like narrow sidewalks, a lack of curb cuts, or obstructed paths of travel

- Disproportionate climate impacts on people with disabilities, and particularly people of color with disabilities, such as impacts on health, infrastructure, and disaster recovery
- Inadequate resource allocation for schools to support students with disabilities
- Intersectional issues impacting disadvantaged students, such as parent teacher associations that don't accommodate working and disabled parents and the higher prevalence of air pollution in low-resourced communities

Recommendations

Research participants provided recommendations for stakeholders and school districts that could rectify rather than repeat inequities impacting disabled students and their families.

- **Consult and include youth with disabilities during transition efforts.**
 - Proactively involve students with diverse disabilities and their families in decision-making during all phases of ESB transition projects.
- **Avoid replicating the same inaccessibility problems present on current diesel school bus fleets.**
 - Prioritize the deployment of buses that serve students with disabilities along with other underserved communities.
 - Every bus procured should have accessibility features, such as a wheelchair ramp or lift, so all students can always have transportation access. Every bus should also include accessibility features that go beyond current accessibility standards.
 - Identify and address the intersectional, environmental, and infrastructural challenges of underresourced communities in the transition.
 - Address current design and maintenance problems. Specifically, malfunctioning wheelchair lifts are unreliable and unsafe for students, drivers, and monitors. Design improvements can also include announcement or noise systems to address the hazards quieter ESBs pose to people with vision disabilities.
 - Make universal design an industry standard.

- Reassess the current system of policy guidance and accountability to ensure that school districts and manufacturers comply with the Americans with Disabilities Act (ADA) and Individuals with Disabilities Education Act (IDEA).

■ **Expand the accessibility of school buses in the transition.**

- Incorporate multipurpose uses of ESBs for students with disabilities.
- Use technology to improve rider comfort, external communication, and safety on the bus.
- Explore additional community-serving and resilience uses of ESBs.

INTRODUCTION

In collaboration with partners and communities, the Electric School Bus (ESB) Initiative of World Resources Institute (WRI) aims to build unstoppable momentum toward an equitable transition of the entire US school bus fleet from primarily diesel-burning fuel to electric, bringing health, climate, and economic benefits to children and families across the country and normalizing electric mobility for an entire generation.

Across the nation, school districts are increasingly integrating ESBs into their school transportation systems. This shift has been supported by federal and state governmental funding, notably the \$5 billion federal investment to initiate the switch to electric and low-emission buses through the Clean School Bus Program (CSBP) administered by the US Environmental Protection Agency (EPA) (White House 2022). As of April 2024, ESBs had commitments for over 12,000 buses across 49 states and several territories and Tribal nations, which is a nearly 10-fold increase in adoption since the initiative first published its dataset in August 2021, when there were just over 1,000 ESBs committed (Freehafer and Lazer 2024).¹ Some government funding programs also include equity provisions, such as prioritizing funding for underserved communities, and, more recently (2023), additional funding for accessibility features. The ESB Initiative is tracking the efficacy of these policies.

This working paper is part of the initiative's efforts to develop a foundation of research into the necessary centrality of equity in the US ESB transition. It builds on the "Equity Framework to Guide the Electric School Bus Initiative" (Moses and Brown 2022) and the "Electric School Bus Initiative Advocacy Stakeholder Analysis: A Baseline Report" (Brown and Curran 2023) (hereafter referred to as "the advocacy stakeholder analysis"). From the advocacy stakeholder analysis outcomes, the ESB Ini-

tiative concluded that further research was required on disability rights and disability justice concerning the equitable transition to ESBs, resulting in this working paper.

Central to an equitable transition, students and adults with disabilities must be among the prioritized communities to realize the benefits of clean transportation. Students with disabilities using transportation services experience several inequities related to the accessibility of school bus fleets. They also continue to experience segregation due to separate special education buses and a lack of fully accessible school bus fleets. Most school buses in a fleet do not include commonly recognized accessibility features such as a power wheelchair lift or retractable entryway ramp, which offer access to students and adults with physical disabilities.

School buses that do include these features are often designated as special education buses, separating disabled students from their classmates. In addition, students have diverse disabilities ranging from physical to cognitive to speech to chronic illness, which broadens our common definition of accessibility. Accessibility features can also include adaptable seats and seatbelts, storage spaces, temperature regulation, air ventilation, audiovisual communications, and reduced stimulation (i.e., noise, vibration).

Students with disabilities from underserved racial or ethnic, gender, sexual orientation, income, or geographic groups also experience inequities due to overlapping systems of discrimination and disadvantage, also defined as "intersectionality" (Crenshaw 1989). The US education system grapples with resource disparities and disparities in outcomes among students (often referred to as the "achievement gap"), which are seen along racial or ethnic, income, geographic, and disability lines (Bradley 2022; Porter n.d.). One study estimates that without changes to determining factors such as inequitable resource allocation, achieving educational parity between white students and students of color could take up to 160 years (Bryant et al. 2023).

The legacies of resource inequities in US schools are visible in the transition to ESBs. In 2021, Maryland's Montgomery County Public Schools (MCPS) Board of Education made a commitment to electrify its fleet over four years. However, in August 2022, MCPS announced that due to supply chain shortages, the school district would still purchase diesel school buses to serve students in its special education program (Ramirez 2022). The Board of Education officially approved the procurement of 90 diesel buses to serve special education students in October 2023. In response, students, parents, and environmental activists rallied to protest the school board's decision, asking for "due diligence and [demanding that the district] be proactive when problems with electric or with transportation arise," rather

than going back on its promise to provide clean transportation (Griffin 2023). Montgomery County is majority Black, Indigenous, and People of Color, and students with disabilities from underserved racial, ethnic, or other groups face overlapping systems of inequitable resource allocation (Griffin 2023; US Census Bureau 2020).

This paper is based on exploratory research and uses an intersectional analysis to understand how the transition to electric fleets affects students with disabilities across various underresourced communities and geographies, particularly rural, Tribal, and communities of color. Given that this group is predominantly impacted by overlapping issues of school bus segregation, poverty, and heightened air pollution, the paper aims to articulate their specific needs and recommendations for an equitable, accessible, and just transition to ESB fleets.

BACKGROUND

In the United States, roughly 20 million children are bused to school each day (School Bus Fleet 2020). About 15 percent of K–12 students, or about 7.3 million children, have a disability (Schaeffer 2023). Integrating disabled students into the public schooling system has been common practice for less than 50 years, since the Education for All Children Act in 1975. Prior to 1975, students with disabilities were often in segregated schools, if in school at all (Dudley-Marling and Burns 2014).² Despite this law's intent to bolster school inclusion of students with disabilities, many disabled students are still segregated in bus routing—they are subject to separate buses (smaller, shorter buses for disabled students) and longer trips than their nondisabled peers (Howley 2001; Ross et al. 2020).

People with disabilities, including students, experience a variety of inaccessibility issues while riding diesel buses that are likely to remain if not addressed in the transition to electric fleet vehicles. Buses are often inaccessible because they lack a feature or support needed to ensure that a person with a disability can board, ride, and disembark safely. Some of these features include proper loading areas, proper tie-downs, space, and adequate training for and retention of bus drivers, monitors, and aides (Ross et al. 2020).

There are also new considerations for accessibility and access with an electric fleet of school buses, such as wiring and power lifts to accommodate wheelchairs and a quieter vehicle that affects people with low vision (BraunAbility 2023). In addition, accessible school travel for disabled students involves a multitude of stakeholders and considerations to plan for, including

students, parents, school transportation board and transit agencies, teachers, and health professionals—all of whom play a role in creating accessible busing.

The gray literature and other research findings suggest that differences in bus routes and trip lengths for students with disabilities often exist because a disabled student might need supports that are not included on all school buses; this leads to the designation of a select few buses available to certain disabled students. Some disabled students may ride to school in a standard size bus (Type C or Type D buses), integrated with nondisabled students, or they may take specialty routed, typically lower-capacity buses (Type A buses) with other children with disabilities.

Segregation in school busing is not limited to students with disabilities and persists along racial and ethnic lines in the United States linked to location. Racially segregated neighborhoods persist today due to multiple federal and local government housing policies. Notably, the Federal Housing Administration's redlining policies, beginning in the 1930s, did not insure mortgage loans in and near African American neighborhoods (Rothstein 2018). Today, segregation and disparities in property values and consequently wealth persist along racial and ethnic lines (Nelson et al. 2023). Local communities across the United States also inserted racial covenants into property deeds, which restricted people who were not white from buying or occupying certain parcels of land. Although the 1948 *Shelley v. Kraemer* Supreme Court decision made racial covenants illegal, the neighborhood property ownership patterns continue to reflect this legacy (Mattke et al. 2022).

Busing has historically been used to increase integration for students of different races and different classes in the United States. However, the *Brown v. Board of Education* court decision did not have the expected impact on school integration. Instead, many white families subsequently moved to neighborhoods where the schools were primarily white, creating stark neighborhood and school segregation (Logan et al. 2017). To address this, a second lawsuit determined that school busing could be used to support integration by busing students outside their district (SCOTUS 1971). While both *Brown v. Board* and integrative school busing were meant to reduce racial segregation for students, schools in the United States continue to be racially segregated (GAO 2022). Thus, students of color with disabilities often experience dual forms of segregation in school busing.

For instance, Cordes et al. (2022) and the Federal Highway Administration (FHWA 2017) found that students with disabilities and students of color experience longer commutes than white and nondisabled students, illustrating that continued segregation of students with disabilities and students of color on school buses with longer commutes can negatively impact student health due to increased exposure to air pollution. Other issues can increase general commute times, as seen in 2022, when the Chicago Board of Education noted that a driver shortage deprived over 1,200 disabled students of school transportation, and over 350 students with disabilities had to endure school commutes of over 90 minutes, compared to 80 percent of routes with an average trip of 39 minutes (Peña 2022). Long commute times have been linked to inadequate sleep and other potential negative outcomes among students, which could exacerbate or create issues of disability for student populations (Voulgaris et al. 2019; Cordes et al. 2022).³

Additionally, bad air quality is shown to have negative effects on the health of children and youth, as well as later in life (Liu and Grigg 2018). Increased exposure to air pollutants can cause respiratory disabilities, and increased exposure in bus cabins can particularly impact children with respiratory disabilities such as asthma, which is found in 4.5 million children in the United States (CDC NCEH 2023). Most of those disabled children (52 percent) live below the poverty line, where Black and American Indian or Alaskan Native children have the highest representation (CDC NCEH 2023).

Today, a move to electric fleets presents another opportunity for integration and increased equity in our schooling systems for students with disabilities, particularly those of color and who live in underresourced neighborhoods. The neighborhoods with the worst air quality are often where the poorest and least-resourced children reside (Morello-Frosch and Jesdale 2006; Konkel 2015). They are often children of color and may already have disabilities. Since 60 percent of low-income children ride buses to school, a move from diesel to electric could result in reduced pollution exposure for students already experiencing poor air quality (FHWA 2017).

Disability justice (DJ) and environmental justice (EJ)

Due to systemic impacts of racism and ableism on students with disabilities, researchers have applied disability justice (DJ) and environmental justice (EJ) frameworks,⁴ which go beyond special education legislation and policies, to look at the justice elements involved in the transition to ESBs. They also investigate how to achieve an accessible and environmentally just transition in school bus electrification. Box 1 below delves specifically into the issue of raw minerals and mining's role in the ESB transition within these frameworks.

Each framework calls for holistic approaches to the pursuit of justice, that is, meaningful involvement of communities in land use planning and adequate long-term investments. Investments can include due attention to community needs, environmental and social remedies, and sufficient funding. Municipal, state, Tribal, and federal investments can be used as a tool to improve built and lived environments. For example, funds can contribute to reparations for environmental harms, fixing sidewalk infrastructure, or enforcing regulations on businesses that produce hazardous conditions compromising community health and safety.

ESBs serve as one of many proposed remedies to address the damage caused by pollution, as evidence finds that children are particularly susceptible to the negative health impacts of diesel exhaust (Liu and Grigg 2018). Truly equitable deployment strategies should ensure investment in districts most harmed by emissions, while distributing innovative resources responsibly without repeating environmentally unjust practices and rolling out plans that include diverse disability considerations. ESBs present an opportunity to increase investment in communities of color, rural and industrial areas, and Tribal Nations. Furthermore, they can also offer a pollution-free mode of transit for the students with disabilities who live in these historically under-resourced areas. Equity thus includes consistent commitments to accessibility across school transportation.

Box 1 | A global glance

In line with environmental justice (EJ) and disability justice (DJ) frameworks, we must consider where raw materials come from that make the transition to ESBs possible. A focus on expanding transportation equity for students with disabilities also requires thoughtful national and global consideration of youth and adults with disabilities who are negatively affected by the rise of electric vehicles as an industry.^a

Electric vehicle batteries are made from minerals extracted from the earth; this is not unlike fossil fuels, which have been extracted in mass quantities for decades. However, there are some legitimate concerns about the environmental and social conditions of mining sites for batteries.^b Mining sites for battery minerals are often located near Indigenous People's lands.^c Approximately 85 percent of the world's lithium reserves are located either on or near Indigenous land.^d In the United States, the mining of lithium poses a significant threat to Tribal communities, as approximately 79 percent of the nation's lithium reserves are situated within a 35-mile radius of Tribal reservations.^e According to advocates, seeking free prior informed consent of communities located near or at extraction sites across the globe is essential.^f Additionally, regulations are needed to limit extractive practices that exploit workers, pollute the air and water of nearby communities, and cause damage to local infrastructure.

Advocates have demanded that the call for electric vehicles not silence the stories and experiences of the people of the global majority who live and work in the very areas where minerals are extracted, with *global majority* being a collective term that refers to people

racialized as Indigenous, African, Asian, or Latin American and/or as ethnic minorities despite constituting 80–85 percent of the world's population.^g Injury, disease, and disability caused or exacerbated by harmful resource extraction cannot be ignored, while the benefits of electrification in America are heralded. Indigenous environmental justice activists have called for land back and an end to extractive mining practices that disturb Indigenous burial grounds, destroy cultural artifacts, and/or impede access to traditional foods and medicinal plants.^h

The Battery Passport, an idea formulated by the Global Battery Alliance, attempts to provide greater transparency about the battery value chain. The passports will ideally allow consumers to scan their electric battery to track and trace its material origin and the environmental impacts on communities across the value chain.ⁱ Although this approach does not resolve the lack of overall data concerning global disability impacts, it may offer an avenue for consumers to further advocate for increased accountability.

As acknowledged in both DJ and EJ principles, suitable remedies for harm must be primarily decided and assessed by those most impacted. Interventions, even with the best of intentions, can increase harm when implemented without invitation from or involvement by those most impacted.^j ESBs are one of many options to help protect the planet from dangerous toxins released into the air by diesel-fueled vehicles. Nevertheless, advocates worldwide have advised that protection must also be extended to the people who reside on the land, breathe the air, and drink the water where resources are extracted.^k

Sources: ^a Agyei-Okyere et al. (2019); Chason and Godfrey (n.d.); ^b Sawyer (2022); ^c Sainato (2023); ^d Owen et al. (2022); ^e Block (2021); ^f IHRB (2022); ^g Campbell-Stephens (2021), 4–6; ^h Siegler (2023); ⁱ GBA (n.d.); ^j First National (1991); Berne et al. (2018); ^k RRI (n.d.); WRI (2024).

Legal context

Although state-level education policies may vary, the United States has passed a series of federal laws establishing transportation access rights and safety requirements for students with disabilities in K–12 and higher education. However, the authors' review of literature and the statements of research participants suggest that many laws and regulations are either outdated or not monitored for compliance. A systemic analysis of these laws and regulations and their enforcement is needed.

In the United States, schools receiving federal funding are subject to Section 504 of the Rehabilitation Act of 1973, which tasked the Department of Education (ED) with certain accessibility requirements in campus access (OCR 2023a, 2023b). This includes busing. The Education for All Children Act of 1975 was updated in 1999 with the passage of the Individuals with Disabilities Education Act (IDEA), both of which establish a series of rights and processes for schools regarding

serving disabled students in K–12 education. IDEA requires transportation for disabled students as a related service to a “free and appropriate” education (O’Neil et al. 2018). A student may have a transportation plan as part of their Individualized Education Plan (IEP) or a Section 504 agreement that lays out an overall plan for a student with disabilities’ access and education (OSERS 2000).⁵ A transportation plan may include specific agreements for mobility training or transit aid for school and school activities. However, transportation plans are necessary but not sufficient to eliminate disability discrimination. For example, the New York Department of Education was found in violation of the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act in 2022 for excluding students with diabetes from field trips and other activities due to a shortage of nurses needed to accompany these students (DRA 2023).

Safety requirements for school buses fall under the Federal Motor Vehicles Safety Standards (FMVSS), enforced by the National Highway Traffic Safety Administration (NHTSA). Amended over the years, the FMVSS includes disability-specific safety measures such as wheelchair lift installations and requirements for child restraint systems (NHTSA n.d.). These laws require elements such as tethers and anchors for student restraints based on bus weight (49 CFR § 571.225). The NHTSA provides additional training and guidance interpretation regarding school buses and disabled students, including on modifying vehicles and student restraints.

Despite legal safety requirements, guidelines, and training, not all students get the proper support they need on the bus or in the classroom. In recent decades, busing has been dangerous and even deadly for some children with disabilities. In New Jersey, a six-year-old wheelchair user died after having her airway blocked by her harness when her school bus hit a series of bumps (Alfonseca 2023). Lawsuits have been brought against schools in South Carolina (Newell and Dickerson 2022) and Michigan (Catallo 2023) after disabled children were attacked on their buses by other students or bus drivers. In response, young adults with disabilities have led their own initiatives for better, more accessible busing access (Martin 2023).

Transportation infrastructure, such as sidewalks and safe intersection crossings, are also of particular concern for students with disabilities. For disabled students walking, rolling, or waiting at bus stops, the conditions of sidewalks and the layout of crosswalks are a necessary consideration for safety and accessibility. Cities across the United States have spent millions in settlements due to inaccessible sidewalks and intersections that do not comply with the Americans with Disabilities Act (O'Hagan 2021).

While current school bus systems continue to struggle to adequately serve students with disabilities, new legislation around ESB transitions has been introduced around the country, but it seldom includes new measures regarding school bus access for students. Bills in states such as Illinois (HB2287) and Washington (HB1368) require that equity measures be taken where ESBs are purchased and used within low-resourced communities. Along with two separate local ESB laws in New York City, New York State has a requirement to transition to all ESB fleets (New York City Council 2021; New York State Assembly 2022). However, as of the spring of 2024, few programs offer additional funds for accessibility features per bus, New York and the EPA's funding programs being among the first (NYSERDA 2024) (EPA 2024a).⁶ Further research is required to determine whether the additional funds per bus are sufficient to cover the costs of an accessible bus.

Additionally, we were unable to determine how or whether the EPA's CSBP monitors compliance with Section 504 of the Rehabilitation Act. When we inquired about program oversight, policy guidance, and nationwide enforcement of disability integration throughout the Clean School Bus Program, an EPA representative replied via email, "It is important to the EPA Clean School Bus (CSB) Program to assist disadvantaged communities and vulnerable populations. Special needs students spend more time in and around school buses, resulting in these students breathing in higher levels of bus exhaust. To help mitigate this issue, EPA will be awarding additional funds for ADA-compliant buses equipped with wheelchair lifts under the 2023 CSB Rebates Program that was launched yesterday (September 28, 2023)."

While these programs are taking measures to address inequities in school districts, government agencies, school districts, and manufacturers don't sufficiently or consistently track information about proactive policy and procurement measures that are inclusive of accessibility. Our research shows that current local and state regulations and guidance documents do not strongly incentivize or enforce the procurement of accessible ESBs.

METHODOLOGY

This paper examines the ways students and adults with disabilities are impacted by electrifying school buses and shares their recommendations for designing a transition that achieves equity and accessibility. For the specific research questions posed by the researchers, see Appendix B. The research approaches (see the next subsection) were designed in acknowledgment of Indigenous and Black feminist research methodologies (Smith 2012; Collins 2000). For example, research practices included sharing knowledge of previous experiences and worldviews, the use of dialogue to develop knowledge, and an ethic of care and personal responsibility with the knowledge and expressions shared during stakeholder interviews.

The recognition of diverse information sources is of particular importance among Indigenous and Black communities, whose histories and systems of knowledge are not always understood or recognized in academic and institutional research traditions and frameworks. Such inequities concerning the credibility of collective or shared wisdom also overlap with the erasure experienced by people living with disabilities (Gilroy et al. 2021). Both DJ and EJ recognize the importance of informed consent (Appendix C), leadership by those most impacted, interdependence, and sustainability. These principles are observed in this paper through a concerted effort to center the reflections and recommendations from diverse students and adults with disabilities.

Participant views on the impacts, barriers, and best practices for achieving disability and environmental justice in school bus electrification are thus prominently presented throughout the “Research findings” section.

This working paper is an exploratory study rather than an exhaustive one. It is not a statistical synopsis of data concerning the impact of ESBs on disabled students. It is, however, composed of narrative analyses intended to gather and present a multitude of perspectives steeped in the priorities, interests, and needs of disabled students.

Research approach

Researchers on our team gathered data and information through gray literature, semistructured interviews, online surveys, a facilitated discussion, and public records review of legal claims and public comments.

Across the research approaches, researchers selected participants based on a wide range of community recommendations, preestablished WRI relationships, and research-based outreach to key stakeholders. In all, researchers solicited participation from over 70 organizations and individuals through email and phone calls. Our outreach included the following types of groups:

- **Advocacy organizations**, including disability-led organizations, identified as having a stake in the ESB transition
- **Federal agencies** connected to the ESB transition
- **Civil rights law centers** working on environmental and disability issues
- **Manufacturers and dealers** identified by WRI as bus companies most frequently used by school districts nationwide
- **Medical research centers** with expertise on health and disability
- **Membership organizations:**
 - Outreach to **parents** through advocates in health, transportation, disability, education, and climate justice
 - Outreach to **students and other youth** through networks of disability and climate organizations with youth programming
- **School districts** with geographic diversity identified through an existing relationship with WRI
- **Unions** connected to transportation services and the e-bus transition

Throughout the research, we categorized participants as “students or other youth” or “parents and professionals.” Due to the intersection of various adult participants as both parents and professionals, the researchers determined not to separate those participants but instead keep them under one categorization that includes both parents and professionals.

A total of 24 individuals representing 16 organizations (Appendix A) contributed to the primary research (9 students and other youth and 15 parents and professionals). The small participant pool also reflects budgetary limitations, as each invitation included an offer to equitably compensate contributors for their time and insights (\$50 for surveys and \$100 for interviews or discussion). The guide and questions used for interviews, surveys, and the facilitated discussion can be found in Appendices D (students and other youth) and E (parents and professionals).

- **Interviews:** Researchers conducted 12 one-on-one semistructured interviews via Zoom lasting 45 minutes to 1 hour (one interview had two representatives present). Researchers posed research questions and follow-up questions based on responses. At the conclusion of each session, researchers encouraged participants to contribute supplementary research questions that helped to uncover new analytical frames and bridge knowledge gaps—a DJ research methodology that centers on the most impacted.
- **Surveys:** Researchers received a total of six surveys (three for students or other youth and three for parents and professionals). In consideration of various communication needs, preferences, and time constraints, researchers offered an online survey option through Google Forms. Researchers created two versions of the survey, one for students or other youth, and one for parents and professionals (with and without children with disabilities).
- **Facilitated discussion:** Researchers facilitated one discussion with six student or other youth participants via Zoom over 1.5 hours. Designed to generate more open conversation and commentary, the discussion was intentionally structured for a small group. Researchers thus adjusted the questionnaire to have a more conversational frame. The collaborative format offered participants a unique opportunity to engage in a collective visioning exercise. Participants discussed the various benefits, barriers, and best practices related to people with disabilities and the use of ESBs.
- **Legal claims and public comments and testimonies:** Researchers conducted an expansive literature review, which also included available legal complaints, public comments, and written and oral testimonies (Civil Rights Division 2022, 2023) regarding disability and ESBs since most disability

rights are primarily protected through complaint-driven processes (US Access Board n.d.; Southwest ADA Center 2018). Researchers used key search terms such as “disability,” “special education,” “school bus,” and “transportation” on repositories such as the Federal Register, Department of Justice, National Highway Traffic Safety Administration, and state and local government entities that recently purchased ESBs (e.g., NYSEDA; Montgomery County, Maryland). Researchers also searched press stories and reports on busing and students with disabilities.

Research limitations

Researchers encountered two timing and data limitations. First, the research period occurred during the summer of 2023, when schools were not in session. Therefore, it was difficult to confirm facilitated discussions with educators, parents, and advocates. Although this paper shares findings captured from 24 individuals across 16 organizations, the sample size, which is typical in qualitative analysis, is not representative of all stakeholders in the ESB transition. Second, there is a lack of consistent data tracking on disabled students and accessible electric transit. School districts, manufacturers, and bus dealers alike were only able to confirm that ESBs have the capacity to be outfitted with accessibility features but did not have national data on the number of accessible ESBs in use at the time of writing.

RESEARCH FINDINGS

The following subsections summarize the research findings. Each subsection includes reflections, ideas, and key findings for an accessible and just school bus transition based on research participants’ context, lived experiences, and professional expertise from the interviews, surveys, and a facilitated youth discussion. For access purposes, participant insights are presented in short summary paragraphs, bulleted lists, and direct quotes within each subsection:

- Inclusion, barriers, and improvements
- Intersectional, environmental, and infrastructural considerations
- Current transportation access challenges and technology concerns
- Educational impacts
- Improving accessibility
- New opportunities and multipurpose uses

Inclusion, barriers, and improvements

“Please don’t wait to think of marginalized folks until the last minute! Everyone deserves to have access to transportation. Electric buses need to accommodate everybody,” one youth survey respondent explained.

Youth participants outlined their main challenges with school transportation, including not being included in decision-making processes. They expressed that students and families with disabilities are often not meaningfully consulted, resulting in inaccessible transportation infrastructure and programming. Participants noted that the inclusion of disabled students through accessible buses is often seen as a choice rather than a requirement. Inequity can be seen in the deprioritization of transportation programming and infrastructure for disabled students. Additionally, youth participants pointed to a lack of versatile and accessible design features on school buses.

“Have advisory groups with disabled students and adults, and actually include that group in decision-making or require their stamp of approval,” recommended a youth survey respondent. “Consistently asking, ‘Is this as accessible as possible?’ and/or ‘How are disabled people affected by this decision?’ throughout the process would also help. Ensuring accessible school buses are transitioned to electric at the same rate or better compared to regular school buses is important.”

Key findings

Note that some of these findings apply across all school bus fuel types.

STUDENTS AND OTHER YOUTH

- Consider the needs of disabled students during bus design (manufacturers) and transportation programming (school districts). Elevate the consideration of disabled students in these processes and ensure that they are not an afterthought or deprioritized; in other words, include them as routine testers of new access features, ensuring that they are not the last to receive access to ESBs.
- Consult students on their needs. Ask students what would make them feel comfortable and included when riding buses. Involve students in conversations and decisions on school district changes to buses and transportation.
- Appoint youth to transportation or policy committees or create student advisory boards at all levels of the transition. Design inclusive committee composition and protocols: explain processes and procedures, provide equal voting power and accessible meeting formats, include more than

one youth representative (as one person is not representative of an entire student body), and include representation from students with diverse disabilities.

- Provide ongoing communication and feedback with students and families during and after the transition. School districts should provide meaningful forums for including students and their families to provide feedback on transportation issues and decisions on an ongoing basis, such as through advisory councils and regular meetings. This contrasts with the standard practice of collecting information during one-time focus groups and surveys.
- Include accessibility features on every bus. Every student participant in the facilitated discussion strongly believed every bus should have accessibility features such as a wheelchair ramp and lift, so all students always have access to all buses.

PARENTS, PROFESSIONALS, AND ADVOCATES

- Document transportation changes and any new student needs in Individualized Education Plans. Share documentation with all relevant staff.
- Some parents, professionals, and advocates also agreed that all buses should be accessible to all students.

Intersectional, environmental, and infrastructural considerations

“I wonder about energy efficiency with bus routing for students in the more rural parts of the district,” reflected one youth survey respondent. “I worry about pushback on [bus electrification] and taking climate action even though our community has been affected by the impacts of climate change already [and] inequitable transitioning of buses across the district and state.”

Youth participants noted several accessibility challenges in addition to environmental and infrastructure problems they have observed in communities of color and low-income areas. Participants opined that these demographics face similar issues with inadequate transportation infrastructure, elevated air pollution levels, and other climate-related impacts because of discrimination and unequal access to critical resources. “The transition to electric school buses is so important when we think of climate crisis and the effect of the climate crisis on students with disabilities,” another student said during the facilitated youth discussion.

During the facilitated discussion with students and other youth, participants shared lived experiences and observations about how students from low-resourced neighborhoods in urban and

rural areas sometimes deal with parallel problems, such as unsafe or absent sidewalks or roads on school commute routes. Participants also wondered whether emergency planning was adequate. Furthermore, they worried that parents who work long hours or multiple jobs may struggle to attend Parent Teacher Association (PTA) meetings to advocate for infrastructure improvements. Consequently, students believe that parents in underresourced communities deserve appropriate accommodations and dedicated advocates that focus on transportation access for students and families.

Youth participants across multiple geographic backgrounds relayed concerns that more affluent areas may receive access to ESBs before students in areas that need them most: low-income, immigrant, farming or other rural, industrial, and urban areas, as well as Indigenous lands. When clean transportation options are unavailable, Tribal and disability rights and justice organizations stated that rural communities feel compelled to accept available forms of transportation, even old diesel buses (Brown and Curran 2023). This lack of transportation access underscores the environmental trade-offs low-resourced communities must contend with when denied access to sufficient funding for clean transportation and infrastructure.

“Many of the roads on the Navajo nation are unpaved,” explained an attorney with the Native American Disability Law Center, “and so families will get down to a central meeting place because it’s paved and the school bus doesn’t have to go off of the main highways. Because if it rains or it’s snowy, these unpaved roads can get very muddy. I’ve had clients who have missed a week of school because the family truck just cannot get out of the property. We’ve had issues where people who use wheelchairs are essentially not able to get out of their homes and get down to the school bus. And so, kids are missing school.”

Students experiencing houselessness also face unique challenges, as school bus routes often do not serve those students. A representative from Soderholm Bus and Mobility, a national distributor of school buses and vans, acknowledged that when students with disabilities living in shelters or encampments do not have access to transportation, they can easily fall behind. This participant cited the experience of Micronesian families who recently immigrated to Hawai’i under the Compact of Free Association with Micronesia. Families moved for housing and jobs, and encountered many social, political, and economic barriers that left many homeless (Lincoln 2015). Some individual schools are filling the gap using creative solutions such as purchasing multipassenger vans, which has helped increase but not resolve the attendance rates of students experiencing houselessness. Noticeably, houseless students with disabilities are impacted by such transportation gaps. Disabled people disprop-

portionately experience chronic homelessness, making up about one-third (31 percent) of all individuals experiencing homelessness in 2023 (HUD 2023).

Adult advocates also remarked on additional infrastructure concerns associated with the electric transition, including street damage caused by an increased number of heavy electric vehicles.⁷ A mobility access advocate explained that potholes and street cracks also create safety risks for disabled students. At the same time, multiple participants also observed that when diesel buses are idling as students who use wheelchairs wait to be lifted, it can further expose youth, drivers, and care aides to more tailpipe admissions. This is yet another key concern for students and adults on the bus with respiratory conditions. Districts hoping to gradually phase in ESBs thus face dual challenges. They face environmental health challenges associated with diesel buses currently in use and the financial challenge of securing new ESBs that are equipped to transport all students.

A representative from Blue Bird, a large school bus manufacturer, offered additional insights: most of the ESB challenges they have observed are related to charging infrastructure, limited battery range that may not serve longer routes, and the cost of accessible ESBs: “There is a challenge related to the range of an electric school bus that can limit its usability in rural or Tribal areas that have longer routes. In addition, the charging infrastructure can be very costly to install. Many school bus facilities do not have the available power to install chargers, which can require costly upgrades from the local utility.” This participant went on to note that cities and school districts without ample transportation budgets can address some of the above challenges by applying for additional state and federal funds, such as the EPA’s CSBP. Much of this funding is earmarked for rural, low-income, and Tribal school districts.

Key findings

The findings here consist of participants’ concerns and considerations regarding the ESB transition. Note that some of these findings apply across all school bus fuel types.

ACROSS ALL PARTICIPANT CATEGORIES

- Disproportionate impact of climate crises on people with disabilities in general, and people of color with disabilities in particular.
- Lack of adequate emergency plans for bus breakdowns, or specific plans for students with various disabilities.
- Concern about an unequal transition to ESBs between affluent and underresourced areas.

- Inadequate transportation access in low-income areas and communities of color, which students noted are demographics that often overlap.
- Restrictive PTA schedules that exclude parents with various work schedules and a lack of available accommodations for disabled parents.
- Unsafe and absent infrastructure like walkable sidewalks in rural and immigrant communities.
- Higher air pollution in poor neighborhoods.

PARENTS, PROFESSIONALS, AND ADVOCATES

- Absence of transportation access for students experiencing houselessness.

Current transportation access and technology concerns

“Just because something is not broken, does not mean it is accessible,” one student explained during the facilitated youth discussion.

Student and other youth and parent and professional participants identified several concerns about perpetuating current transportation access and technology challenges. Challenges include malfunctioning or inconsistent availability of accessible transportation, limited resources, and early adoption burdens. Additionally, Box 2 below examines paratransit’s role in transporting students with disabilities.

Participants pointed out several accessibility issues with malfunctioning or outdated wheelchair lifts on their current diesel buses. Many school buses have lifts that require students with wheelchairs to navigate onto the lift backward. This is a problem for students with wheelchairs who also have dexterity difficulties or other disabilities related to sight and hearing. Navigating backward is also challenging during intense weather conditions such as rain, ice, and snow—all of which are increased by the ongoing climate crisis. One student said they encountered transportation access issues at least three times a week. Before the school day even begins, students with disabilities report dealing with barriers including malfunctioning lifts, broken wheelchair securements, and prolonged wait times when staff are unfamiliar with access features on buses. Participants voiced concern that if these issues are not addressed in the transition, they will continue with the new electric models.

Adult participants stated that drivers and paraprofessionals and caregivers with disabilities and access needs should also be considered throughout the transition. Participants observed that back injuries and other physical health problems have

impacted bus drivers due to high vibration levels on diesel buses. One participant explained that whole-body vibration happens when buses don't have independent suspension. Drivers and passengers on Type D buses, whose driver seats are near the front wheel, can endure magnified G forces to the body. "Electric buses offer a smoother and less bumpy ride for everyone, including bus drivers," noted an Amalgamated Transit Union representative. "Improvements such as these can contribute to better work conditions for drivers and will ideally lead to greater availability of skilled drivers [and] mechanics."

"Back injuries for bus drivers and truck drivers are incredibly high," the union representative continued. "It's because of how buses and trucks are designed. They don't have to be that way. If buses were made to work better for bus operators, people would stick around in those jobs longer, and you wouldn't have as many staffing shortages. You wouldn't have people calling out sick as often or going on as much leave."

The Amalgamated Transit Union representative went on to echo student concerns regarding the use and upkeep of ramps and lifts. They explained that inaccessibility challenges are also caused by absent workers. "Inaccessibility for school buses is also when buses don't show up. The number one reason for that is because they don't have a bus operator, or maybe a monitor. They [schools] can't send the bus out. And some of that, of course, is the ability to attract and retain skilled mechanics. There needs to be training also for maintenance staff to make sure that they know what they're doing when it comes to wheelchair lifts and battery electric buses when districts transition."

One school official reflected on resource limitations and how prioritizing accessible buses in the transition could help with driver retention: "In our district, our goal was to target routes that transport students with disabilities. However, I was informed that we needed to purchase the bigger buses. Typically, we transport students with disabilities in smaller buses. I wonder if there's a way to strategically indicate the need to allocate some of those resources to transport the disabled students. I also see it from the lens of retention. If we have nice buses, our drivers will be incentivized to stay within our district. Therefore, we will have the available resources to ensure we can meet the needs of our district." At the time of writing, we do not have the necessary data to know if the ESB transition is happening at the same rate across the various bus types. Further research is needed.

Additionally, one parent and disability justice advocate explained how some school districts deal with multiple transportation access barriers, such as limited budgets and staff shortages: "Students of color with disabilities and/or disabled students who are low-income or in geographically low-resourced areas, often reside in school districts with limited funds and as such, are less

Box 2 | Paratransit

When available, paratransit has become yet another mode of transportation for students when public and school transit options prove to be inaccessible. Paratransit vehicles typically consist of door-to-door transport on multipassenger vans equipped with wheelchair lifts and/or ramps. Paratransit programs can also be administered through discounted use of taxicab services. The National Aging & Disability Transportation Center defines the relevance and reach of paratransit: "The Americans with Disabilities Act (ADA) requires public transit agencies that provide fixed-route service to provide complementary paratransit service to people with disabilities who cannot use the fixed-route bus or rail service because of a disability. The ADA regulations specifically define a population of customers who are entitled to this service as a civil right."^a

Similar to public transit and school buses, paratransit is not without its challenges. Extensive wait times, ride restrictions based on city budgets, and no service at all in many rural and Tribal areas are a few of the issues and inconsistencies associated with paratransit systems.^b At the time of this writing, we were unable to confirm any city paratransit systems that have transitioned to electric buses.

Sources: ^a NADTC (2023); ^b Venkataram et al. (2023).

likely to be in a position to be early adopters of bus electrification. They might face a shortage of bus drivers and might have to contend with an already aging fleet of buses. They are also more likely to encounter bus sharing as well. The public might have safety fears or concerns due to limited familiarity with bus electrification. For decision-makers, cost could be a concern, even though in the long run this will be a worthwhile investment that is better for the environment and cost-effective. But because there will need to be sufficient investment of initial and ongoing resources to make things happen, the high short-term costs could be a deterrent."

The recent policy prioritization of underresourced communities in ESB funding could address resource limitations, but participants also emphasized that protective measures for early technology adopters should accompany the ESB transition. A representative from New York Lawyers for the Public Interest described their policy platform to prioritize disadvantaged communities: "We found that in some cases you have hundreds of diesels and gasoline school buses clustered together. And they are in the same environmental justice communities where other pollution sources are also concentrated. . . . Our policy push has been for the city and the state not just to mandate, as they have, an all-electric bus fleet by 2035 but to prioritize getting

electrification to happen first in disadvantaged communities that are most impacted by the current polluting school bus fleet and other pollution sources.” Participants supported this prioritization, and added this should be “priority without penalty.” The burdens of being the first to receive and test new technology can be costly and time-consuming for districts, which could experience the “early adopter tax,” or the fact that new technology costs more when released and includes defects that get resolved in later models (Rogers 1962). Advocates noted that being first also involves the added pressure of executing all plans perfectly for fear that any perceived failures will be used as a convenient excuse to deprioritize impacted communities in the future.

Key findings

Note that some of these findings apply across all school bus fuel types.

STUDENTS AND OTHER YOUTH

- Unreliable ramps and lifts that frequently malfunction, creating unsafe and unreliable conditions.
- Insufficient wheelchair space for multiple students with disabilities on most buses. This is a design flaw that assumes multiple disabled riders won’t be present at once.
- Sound and scent overstimulation from vibration, noise, and inhaling diesel fumes. These pose health and wellness challenges for riders and operators, such as migraines, dizziness, asthma attacks, panic attacks, or disorientation.
- Safety risks caused by untrained, inexperienced, or impatient bus operators and bus monitors.

PARENTS, PROFESSIONALS, AND ADVOCATES

- Efforts to prioritize disabled students during the transition without imposing harms from adoption of new technologies.
- Concern about financial cost and community readiness.
- Need to ensure bus operators’ safety and wellness.
- Repetition of inaccessibility challenges present in diesel fleets.
- Irregularities around existing infrastructure.
- Incorporation of cognitive accessibility and language justice in all communication.
- Adoption of universal design principles, including seat fabric and texture, wheelchair-dedicated spaces, climate control, high-quality ventilation, lighting, and noise regulation.⁸

Educational impacts

“Some students require door-to-door transportation,” noted an attorney with the Native American Disability Law Center. “And [they] are legally entitled to transportation as a related service and any of the other accommodations needed to be transported. I’ve had clients who feel like they’re at the bottom of the list because the general education students are typically transported first, and then maybe the students with disabilities arrive at school an hour or two later.”

Youth participants discussed the academic impacts of inaccessible and unreliable transportation on students. They urged school officials not to penalize students for tardiness or absences caused by transportation issues. “No one should be punished for being late or missing class due to failure of transportation,” declared one student during the facilitated youth discussion. Students also acknowledged that transportation issues can cause learning loss. Participants recommended that if transportation policies are revamped during ESB transitions, they should include solutions for students who deal with delays, absences, and academic setbacks related to transit.

Key findings

Note that some of these findings apply across all school bus fuel types.

ACROSS ALL PARTICIPANT CATEGORIES

- Reparative measures to address academic setbacks. School districts can provide long-term support and transportation to help students make up missed work in summer school, winter term, or after school tutoring.
- Need for school districts to reconcile negative school records, which matter for college and career prospects.
- Need to restructure school days to better accommodate drivers, students, and bus capabilities.

Improving accessibility

“Just like Walt Disney World buses, every bus should have a wheelchair ramp,” remarked one youth survey respondent. “What makes a bus comfortable is being close to peers. It is uncomfortable having to be stuck in the back of the bus. Another good design would be to have an accessible area in the center of the bus so there are a variety of areas for friends to sit near you.”

Youth, parent, professional, and advocate participants identified several recommendations to improve school bus accessibility and rider experience. Participants cited many design recom-

mendations for bus manufacturers as well as transportation programming recommendations for school districts. Additionally, many participants recognized that funding is a pivotal factor in district decisions to transition school bus fleets and in manufacturer decisions to include accessible design features.

“My accessibility dream would be for electric school buses to be designed similarly to public transit buses,” said one youth survey respondent. “As a kid, I always wanted to ride the bus with all the nondisabled kids as opposed to being segregated to an accessible bus. I do absolutely understand that some students need that separate bus in a more directly supportive environment, but it seems like school buses should be able to be made inclusive, especially as they’re already being designed differently to be electric.”

Key findings

Note that some of these findings apply across all school bus fuel types.

STUDENTS AND OTHER YOUTH

- Commitments from manufacturers to design features that go beyond lifts and ramps, such as various options for seat fabric and texture, wheelchair-dedicated spaces throughout the bus, climate- and temperature-controlled seating, high-quality ventilation, and sufficient lighting.
- More flexible seatbelt material and related options for sensory and allergy disabilities.
- Heating and cooling units on all buses. Everyone has different temperature needs. Invest in insulation as well as safe heating and cooling options. Buses constantly open and close their doors, so it can be hard to control the temperature. Having seats that allow students to self-regulate between cool and heat would be very helpful for all riders.
- More than one wheelchair tie-down spot. School buses that carry a dozen or more children should have multiple spaces to secure wheelchairs.
- Larger rooftop safety hatches on buses to accommodate emergency evacuations for students with all body types and to create another point of entry for extensive medical equipment during emergencies.
- A reliable remedy to steep school bus stairs. Students with mobility disabilities who do not use wheelchairs or who feel unsafe standing or sitting on a lift often only have the option to mount the stairs.
- Visual and verbal announcements about upcoming stops or important school updates.

- Rapid-response plan for fixing broken lifts or other malfunctioning access features on school buses. There should be a plan for students with disabilities if their bus breaks down on the side of the road. Forcing students to be carried off by staff and/or to leave their mobility devices behind is not an equitable plan, especially in nonemergency situations. When a bus breaks down and students are transferred onto another bus, there should be a process in place to make that transition as dignified and safe as possible. This includes a plan for mobility equipment.
- Opportunities to have meetings with the people who design ESBs. Manufacturers can design alongside disabled student riders and offer test rides for students with different types of disabilities to make sure the buses can meet a variety of needs.
- ADA compliance of all school buses.

PARENTS, PROFESSIONALS, AND ADVOCATES

- School districts should transform their transportation policies regarding students with disabilities alongside the bus transition. Otherwise, school districts risk repeating the same patterns of current transportation exclusion and policy inequities.
- All school districts must comply with preexisting statutory obligations under the ADA and IDEA.
- School districts should consistently address safety risks caused by untrained, inexperienced, or impatient bus operators and bus monitors.
- Manufacturers should address current design problems and dedicate attention to innovative access options for students with disabilities.
- Produce and procure more low-floor Type D buses with ramps. This approach would mirror the access found on public transportation buses and foster a greater sense of equality by allowing all students to enter and exit the bus from the same door.
- Widen bus aisles to accommodate various body types as well as assistive equipment.
- Install air filtration systems on buses that have yet to transition. This is a measure of support that can be offered to immune-compromised kids or those sensitive to the smell and fumes from diesel emissions.
- Install handholds on all school buses to prevent falls and assist with mobility support.

- Create mobile applications that allow students and parents to track school buses. Apps could also allow students and their families to contact drivers or dispatchers.
- Develop sound mitigation to address overstimulation through manufacturer design or other mitigation measures. Offer noise-canceling headphones or other audio aids for students impacted by the continuous noise generated by buses.

New opportunities and multipurpose uses

“It would be amazing if accessible electric buses could also provide transportation options for disabled people outside of getting students to school, especially in communities without public transportation,” said one youth survey respondent. “Many disabled people can’t get to medical appointments, errands, work, or social events without relying on friends or family because there’s no public transportation.”

Participants across groups identified several new community-serving uses of accessible ESBs. These include system changes that expand when and where buses are used to provide accessible transportation options for students and families with disabilities to access community activities and services. Accessible ESBs could also serve as resilience hubs during extreme weather events or as a community asset, such as a mobile library. This helps ensure that students with disabilities and their families are not left out of recreational and educational opportunities when other accessible public or private transit options are unavailable.

However, one professional participant worried about “taking buses away from the central mission of transporting students” because “those problems disproportionately fall on people with disabilities or parents with students with disabilities.” This comment also reflects concerns about the consequences of unequal impacts of worker shortages, worker benefits such as sufficient overtime pay, and worker protections, which adequate funding and proper planning could address in the transition.

In addition to improving accessibility, several students also requested an expansion of accessibility across school bus fleets to reduce segregation. In the advocacy stakeholder analysis, a participant representing a disability rights and justice group pleaded, “Do NOT separate us,” referring to the practice of segregating disabled students from the general student population in school transportation (Brown and Curran 2023). This sentiment was consistently expressed during discussions with groups advocating for disability rights and justice. Keeping students with disabilities separate can isolate them.⁹

Key findings

The findings here describe the types of access participants want from ESBs. Note that some of these findings apply across all school bus fuel types.

STUDENTS AND OTHER YOUTH

- Extracurricular activities.
- Increased resources for families to attend school and community functions. This can be a major benefit for disabled parents without other reliable sources for transportation.
- Career opportunities and trainings. This is especially important for disabled people, who frequently face employment discrimination.
- Activities such as festivals, parks, and movies.
- Libraries, community centers, college tours, field trips, and the like.
- Prioritizing of ESBs as an option for accessible community transit since private transit is not always accessible to or affordable for everyone.

PARENTS, PROFESSIONALS, AND ADVOCATES

- Mobile heating and cooling units during extreme weather events.
- Mobile clinics and/or emergency evacuations during disaster-response events.
- Mobile power sources during electricity outages.
- Charging stations for power wheelchairs and other assistive devices.
- Community and group gathering spaces.
- Intentional learning or coworking hubs.
- Wi-fi source in areas without high-speed or reliable internet connections.
- Mobile libraries.
- Public transportation option in rural areas when the buses are not in use for school-related activities.
- Accessible transportation option to camps, athletic events and practices, and theater rehearsals and shows.

DISCUSSION

All stakeholders involved in the ESB transition should recognize the wholeness of both students and those charged with their safe passage to and from approved activities. A quieter ride with fewer vibrations can be more comfortable for students with disabilities and improve the overall experience for both students and drivers. A local school district in West Virginia found that its ESBs allowed for easier communication between the driver and students, reducing behavioral and sensory disruptions (Ekbatani 2024).

Education, health benefits, robust leave options, and pay parity can also contribute to the safety, wellness, and retention of bus drivers, care aides, and mechanics. Accessibility standards outlined by the US Access Board related to charging infrastructure could also impact work conditions and offer additional ease for drivers and operators. For example, all EV chargers should have clear floor or ground space at a minimum of 30 inches by 48 inches and have accessible communication features, such as tactilely discernible features, speech output, or audio descriptions (US Access Board 2023).

Precisely where older diesel buses end up posttransition is also pertinent. In consideration of this concern, we coined the term “echo exposure,” which occurs when older school buses are no longer directly exposing students to diesel emissions but may emit harmful chemicals while used for other community activities. To reduce such exposures, districts can investigate what happens to old diesel buses once they are no longer in use for transporting students. For example, are the buses sold to nursing homes, churches, or community centers that also serve a large population of disabled individuals?

If so, the harms caused by diesel buses have not been remedied but rather transferred to other community members. Questions concerning whether older buses are sold or donated to these communities are equally relevant. Districts can ask buyers or recipients if the older buses are slated to end up in the global South because again, transferring harm is not the same as helping to transform conditions of inequity.¹⁰ As of January 2024, the ESB Initiative’s Clearinghouse identified 31 of 89 funding programs for an ESB as having a scrappage requirement (Levinson and Achury 2024). Students and other youth with disabilities who ride older diesel school buses to and from day programs must also not be forgotten throughout the transition. As disability advocates have called for over many decades, people with disabilities deserve sufficiently supported community-based living options. Until the disability justice principle of collective liberation is fully realized, those in jails,

prisons, and other institutional settings also deserve safe and accessible transportation that does not expose them to harmful diesel emissions.

RECOMMENDATIONS

This section summarizes actionable recommendations from students, parents, and professionals to ensure that the school bus transition meets the needs and rights of disabled students and adults. For specific recommendations from participants, please see the “Key findings” subsections in the “Research findings.”

Consult and include youth with disabilities during transition efforts

In line with the 10 principles of disability justice (Sins Invalid 2015), specifically “Leadership by those most impacted,” students with disabilities not only need to be included in the ESB transition process but also should be at the forefront of all stages of transition efforts.¹¹

RECOMMENDATIONS: ALL STAKEHOLDERS

- Actively solicit the input of students with disabilities on ESB transition projects. Proactively engage students with disabilities and their families rather than waiting for them to reach out.
- Create engagement opportunities in multiple forms (e.g., hybrid meetings, surveys, focus groups) throughout and after the transition process.
- Create a feedback process (in multiple formats) for all engagement activities.
- Appoint disabled students to all advisory boards connected to the transition. Have more than one youth representative. Design inclusive meeting protocols and processes.

Avoid replicating the inaccessibility problems of current diesel school bus fleets, and expand the accessibility of school buses in the transition

Participants recommended the following actions to achieve equitable access in school transportation:

- Include the needs and concerns of disabled students in advocacy, manufacturing, procurement, and distribution of ESBs.

- Provide students and adults with disabilities with opportunities to help lead advocacy efforts across all aspects of the ESB transition.
- Identify and address the intersectional, environmental, and infrastructural challenges of underresourced communities in the transition.
- Calculate the cost scenarios for implementing the recommendations to achieve wider transportation accessibility. Publish the information to support advocacy, policymaking, and school district and manufacturer decision-making.

RECOMMENDATIONS: SCHOOL DISTRICTS AND TRANSPORTATION OFFICIALS

- Prioritize the deployment of buses that serve students with disabilities along with other underserved communities.
- Include accessibility features, such as a wheelchair ramp or lift, on every bus to create universal transportation access for students with disabilities.
- Address current maintenance problems, specifically with malfunctioning wheelchair lifts that are unreliable and unsafe for students and school bus drivers and monitors.
- School districts should address safety risks by improving training and increasing service capacity for bus operators and monitors. This will mitigate other students with disabilities having the same experience reported by interview participants who felt their safety was sometimes at risk due to untrained, inexperienced, and impatient bus operators and monitors.
- Explore additional accessible transportation or resilience uses for ESBs (mobile libraries, charging stations, emergency evacuation, etc.).

RECOMMENDATIONS: MANUFACTURERS

- Develop and offer innovative access options for disabled students.
- Highlight the availability of the various accessibility specifications to school districts procuring ESBs.
- Address current design problems, specifically with malfunctioning wheelchair lifts that are unreliable and unsafe for students and school bus drivers and monitors.
- Include an announcement or noise system to address the hazards more silent ESBs pose to people with vision disabilities.
- Make universal design an industry standard.

RECOMMENDATIONS: POLICYMAKERS

- Reassess the current system of policy guidance and accountability to ensure that school districts are complying with the ADA and IDEA, in contrast to the current complaint-driven system of enforcement.
- Incentivize school districts and contractors to prioritize transitioning the buses that serve students with disabilities and to expand the number of buses that can serve them.
- Prioritize funding applications requesting accessible ESBs alongside those of other underserved communities.
- Grant additional funds to school districts purchasing accessible ESBs.

CONCLUSION

This working paper has examined how students and adults with disabilities are impacted by the electrification of school buses. The research participants shared insights on current transit inequities and new access possibilities for ESB transportation. They revealed a remarkable array of lived experiences, problems, and hopes for the future. The research findings revealed key patterns in the intersectional environmental, infrastructure, and accessibility challenges that disabled students and adults face. The findings also provided actionable recommendations to address these challenges and to expand what is possible for accessible transit.

An overarching theme in the findings is a vision for universally accessible transportation. To achieve this vision, the recommendations point to actions that stakeholders can currently take, such as improving compliance with disability laws and inclusion of people with disabilities in decision-making. The recommendations also point to research gaps for future exploration, such as understanding the economic costs and the policy advocacy case that can be made for the mass production of accessible ESBs. Giving all students access to all buses is possible. Meaningful inclusion of students with disabilities as leaders on design teams, planning teams, policy committees, monitoring and evaluation teams, and across engagement groups is possible. Safer conditions and worker protections for bus drivers and monitors are possible. Rectifying the harms caused by extractive resource practices is possible. Effective oversight to assure compliance with current disability laws throughout the transition is possible. If this transition can be truly grounded in principles of environmental and disability justice, then equitable possibilities are indeed endless.

School bus electrification's contribution to reducing pollution and negative health impacts will therefore also hinge on the ability to provide benefits and avoid harms to underresourced communities. Achieving environmental and disability justice in the ESB transition will require additional funding, leadership by those most impacted, accountability measures, and a sustained commitment from all parties involved. Disability is often a convenient excuse to deprioritize. Funding restrictions are often framed as innocuous and unavoidable. Communities of color and low-resourced areas are consistently expected to sacrifice their safety, wait longer to receive resources, succeed without sufficient support, and accept environmentally dangerous conditions as the norm. These inequities must be acknowledged and addressed in ways that shape future decision-making.

Students, parents, caregivers, advocates, educators, drivers, monitors, policymakers, manufacturers, and other professionals play essential roles in transitioning the vision for fully equitable and accessible ESB fleets into reality. Everyone has a role to play on this journey toward fully equitable and accessible ESB fleets. As the central focus of this paper, students and other youth with disabilities have provided each section with immensely imaginative ideas. Their concerns are connected to lived experiences and what they have witnessed both on and off school buses. Participants expressed how they are the key to unlocking seemingly impenetrable doors. They are the guides this transition needs. With their leadership, all passengers are far more likely to conveniently board, comfortably ride, and safely be transported on ESBs.

APPENDICES

Appendix A. Participant organizations

ORGANIZATION NAME	ORGANIZATION TYPE	TYPE OF PARTICIPANT	NUMBER OF PARTICIPANTS	METHOD OF PARTICIPATION
Able South Carolina	Disability-led advocacy	Student or other youth	2	Facilitated discussion
Advocacy without Borders	Advocacy	Parent and/or professional	1	Survey
Amalgamated Transit Union	Union	Parent and/or professional	1	Interview
Association of Programs for Rural Independent Living	Disability-led membership	Student or other youth	2	1 facilitated discussion and 1 survey
Blue Bird	Original equipment manufacturer	Parent and/or professional	1	Survey
Boston Public Schools	Public school district	Parent and/or professional	1	Interview
Dallas Independent School District	Public school district	Parent and/or professional	2	1 interview and 1 survey
Disability EmpowHer Network	Disability-led membership	Student or other youth	2	1 facilitated discussion and 1 survey
Disability Rights Education & Defense Fund	Civil rights law center; advocacy	Parent and/or professional	1	Interview
Disability Rights Washington—Disability Mobility Initiative	Advocacy	Parent and/or professional	1	Interview
Individual	N/A	Student or other youth	3	2 facilitated discussion and 1 survey
John Hopkins Disability Health Research Center	Medical research center	Parent and/or professional	1	Interview
Native American Disability Law Center	Civil rights law center	Parent and/or professional	1	Interview
New York Lawyers for the Public Interest	Civil rights law center	Parent and/or professional	2	Interview
Soderholm Bus + Mobility	School transportation dealership	Parent and/or professional	1	Interview
US Access Board	Federal agency	Parent and/or professional	1	Interview
US Department of Education	Federal agency	Parent and/or professional	1	Interview

Appendix B. Research questions

The following questions were posed to parents and professionals who served as research participants. A slightly amended version, written in more conversational language, was provided to student participants. The first four questions listed below are the primary research questions. The remaining six questions consist of more specific survey and interview questions. Researchers intentionally chose to intertwine research and interview questions to offer all participants an unobstructed view of each topic and theme covered in the paper. This approach allowed every participant to comment on every aspect of the research, which proved invaluable as many participants identified across multiple stakeholder groups (e.g., a parent with a disability who was once a youth with disabilities and is now a health equity expert). Consequently, researchers chose not to constrain participant responses by predetermining which questions would be most applicable but instead provided ample opportunities for participants to opt out of any question that was not relevant to their experience or expertise.

1. How can key actors (such as school districts, school bus manufacturers, and policymakers) involved in the transition to electric school buses ensure that the needs, rights, and participation of students and adults with disabilities are included?
2. What are the challenges faced by the disability community, including students with disabilities in rural, urban, and Tribal areas, concerning the transition to electrify the US school bus fleet? How are students of color with disabilities uniquely impacted by this transition?
3. What are the effects of school bus electrification for students and nonstudents with a broad range of disabilities, including physical and nonphysical? Specifically, what are the potential health effects from air pollution, changes in road traffic, sound conditions on the bus, and others?
4. What are the effects transitioning the fleet may have on the multiple uses of school buses and how does this intersect with transportation access for the disability community outside of school-related activities?
5. What design features make an electric school bus accessible, or inaccessible, for students with disabilities and how common are these features among fleets that have transitioned or intend to transition?
6. In what ways can the transition to electric buses serve students with disabilities who either don't have access to school-related activities or have dropped out due to challenges around transportation access?
7. How can the transition to electric buses be used to rectify the harm of students, or prospective students, with disabilities being left behind? For example, those penalized or criminalized due to truant-related offenses that stem from a lack of accessible transit.
8. How can youth climate and youth transportation justice leaders with disabilities be provided with more opportunities to equitably engage on the electric transition of school buses?
9. Is there any angle or aspect of this issue that we are missing or did not address?
10. How can a project such as this further support students with disabilities? What additional needs, priorities, or interests should WRI consider?

Appendix C. Informed consent form

Title of project

Stakeholder Analysis: Disability Rights and Justice Working Paper on Increasing Equity and Inclusion in the Transition to Electric School Buses

Purpose of research

You are invited to participate in a research project being led by Justice Shorter, Valerie Novack, and Alyssa Curran on behalf of the Electric School Bus (ESB) Initiative, administered by World Resources Institute (WRI).

The purpose of the research is to determine how people involved in disability rights and disability justice view school bus electrification, what their needs might be, and their electric school bus experiences.

This research project is part of WRI's Electric School Bus Initiative, which is collaborating with partners and communities to build unstoppable momentum toward an equitable transition of the US school bus fleet to electric by 2030, bringing health, climate, and economic benefits to children and families across the country and normalizing electric mobility for an entire generation.

You are being asked to participate in this project because you are a representative of a community organized around one of the following issues: environmental justice, disability rights, disability justice, health equity, transportation and mobility justice, or Tribal rights.

Research process

Researchers will collect information through questions. If you agree to be part of the project, you can choose to participate through one of three methods. These three methods include an online survey, a one-on-one interview, or a facilitated group discussion. Check the box below to identify how you would like to participate.

Please contact Alyssa Curran at Alyssa.Curran@wri.org if you need additional time or other reasonable accommodations to participate in this project.

- Online survey (\$50 honorarium, estimated 20 minutes to complete)
- One-on-one interview (\$100 honorarium, estimated 30–60 minutes to complete)
- Facilitated group discussion (\$100 honorarium, estimated 1 hour–1.5 hours to complete)

It's all voluntary

Participating in this project is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. Also, you may choose not to complete this research process or not answer specific questions for any reason.

We keep it confidential

We will be video-recording interview and facilitated discussion sessions to ensure that we accurately capture what is shared with us. After today, the video recording will be used to transcribe our conversation. We will then permanently delete the recording after our transcript analysis is complete.

The final report will not include individual personal information, such as your name, image, and voice. The final report may include your organization's name (if applicable). Please let the interviewer know if you would not like your organization's name to be included in any published materials or reports.

Please note for the facilitated group discussion sessions, we ask participants not to reshare others' information outside of the discussion group. Although confidentiality is strongly encouraged, we cannot guarantee that another participant won't share information.

Transparency and accountability questions (TAQs)

- Whose research is it?
 - Justice Shorter, Valerie Novack, and World Resources Institute (WRI)
- Who owns it?
 - World Resources Institute (WRI)
- Whose interests does it serve?
 - The WRI Electric School Bus Initiative, stakeholders in the electric school bus transition, students with disabilities
- Who will benefit from it?
 - The WRI Electric School Bus Initiative, stakeholders in the electric school bus transition, students with disabilities, school districts, the disability community

- Who has designed its questions and framed its scope?
 - Justice Shorter, Valerie Novack, Alyssa Curran (WRI), Charles Brown (Equitable Cities), Carla Walker (WRI)
- Who will carry it out?
 - Justice Shorter, Valerie Novack, Alyssa Curran (WRI)
- Who will write it up?
 - Justice Shorter, Valerie Novack, Alyssa Curran (WRI)
- How will its results be disseminated?
 - The working paper will be made publicly available, in multiple formats, on the WRI and Electric School Bus Initiative website. The WRI team and authors will promote the paper and resulting tools and resources.

Contact information

If you have questions about this project, or would like a copy of this language emailed to you, please contact Alyssa Curran at Alyssa.Curran@wri.org with the subject line "Electric School Bus Advocacy Stakeholder Analysis." If you have questions or concerns about your rights as a participant, you can contact the WRI Human Subjects Director at humansubjects@wri.org or (+1) 202-729-7699.

Your consent

I understand what the project is about, and any questions I had have been answered. By continuing with the interview, I am consenting to participate in the research project, understanding that my responses will be used in WRI research products in an anonymous manner.

- Name
- Email

Preferred method of payment

- CashApp
- Venmo
- PayPal
- Zelle
- I decline the honorarium

Username on preferred payment platform

If you are declining the honorarium, please write-in N/A.

Appendix D. Student survey

Project background

To give you some background on the organization behind this survey, World Resources Institute (WRI) is a global nonprofit organization that works with leaders in government, business, and civil society to research, design, and carry out practical solutions that simultaneously improve people's lives and ensure that nature can thrive. In 2020, WRI was awarded a \$30 million gift by the Bezos Earth Fund to launch the Electric School Bus Initiative (ESB Initiative). In collaboration with partners and communities, WRI's ESB Initiative aims to build unstoppable momentum toward the equitable transition of the US school bus fleet to electric by 2030, bringing health, climate, and economic benefits to children and families across the country. The ESB Initiative seeks to engage with the broader constellation of e-bus stakeholders to influence and build on growing electrification momentum by offering technical assistance to school districts, convening industry experts in working groups, collecting data, providing analysis for research dissemination, advocating for policies at the federal and state level, and engaging in a variety of partnerships with environmental, equity, and community organizations. The ESB Initiative centers equity in all its work.

The goal of this survey is for us to gain a better understanding of

- current knowledge gaps in disability rights and justice and ways to support existing efforts to center transportation equity and inclusion overall;
- background on the current status of transportation access for students with disabilities with regard to school bus electrification;
- recommendations for the ESB Initiative's work with students, parents, school districts, school bus manufacturers, and policymakers in support of disability rights and justice;
- information that advances the goal of equitably electrifying the US school bus fleet, with particular attention paid to inclusion for students with disabilities;
- multipurpose usage of electric school buses that offers additional support for people with disabilities;
- benefits and barriers faced by the disability community regarding the transition to electric buses; and
- intersectional considerations: the combination of multiple factors such as geography, race, gender, and income levels related to students disabilities and ways to steer to a more just transition.

A research paper will be developed primarily for the ESB Initiative's internal use but will also be shared publicly to inform other stakeholders.

Grounding

Disclaimer: Multiple assessment factors are used to determine a student's disability. However, many students of color, students in low-income areas, and immigrant families face inequitable access to obtaining requisite diagnostic testing and medical documentation. These metrics also do not account for alternative ways of validating "embodied knowledge" concerning body-mind awareness, family histories, and daily experiences. For the purposes of this survey, and the research paper that it will inform, the phrases "students with disabilities" and "adults with disabilities" will refer, but are not limited, to those with

- physical or mobility disabilities;
- cognitive or intellectual disabilities;
- hearing loss or deafness;
- vision loss or blindness;
- deaf-blindness;
- speech or communication disabilities;
- learning disabilities;
- mental health or psychiatric disabilities;
- traumatic brain injuries;
- autism; and/or
- chronic illnesses.

Please note: "I don't know" or "n/a (not applicable)" are also suitable responses to the required questions below. It is completely fine if you are simply unsure of how to answer or don't feel comfortable responding to a question outside of your experience, expertise, or awareness. It is also okay to copy any questions you want more time with and send an email with responses after you have submitted the survey.

- Name
- Email

Inclusion and impacts

Let's immediately start with inclusion. Our first set of questions are all about how electric school buses might impact students with disabilities.

- How can everyone involved with the transition to electric school buses make sure that the needs, rights, and participation of students and adults with disabilities are included?

- Do you attend school in an urban, rural, or Tribal area? If so, which one? What challenges can you imagine that the change to electric school buses might cause for students with disabilities in your community? What other transportation challenges might be faced by students of color with disabilities and students with disabilities in poorer communities?
- How would electric buses impact students and adults with disabilities? For example, impacts related to air pollution, changes in road traffic, sound conditions on the bus, and so on.

Use and access

Next, we'd like to talk more about the use of electric school buses and the importance of access.

- How should electric school buses be used to support both students and adults with disabilities? In what ways would you suggest they be used to provide transportation access outside of school activities for those with disabilities?
- What designs do you think would make an electric school bus most comfortable, safe, and easy to use for students with disabilities? What makes a school bus feel uncomfortable, unsafe, and difficult to use for students with disabilities? How often do you experience accessible or inaccessible features when riding school buses? What accessibility dreams do you have for the electric school buses?
- How can electric school buses serve students with disabilities who either don't have access to school-related activities or have dropped out because of challenges with transportation?

Harm and hope

Now, let's discuss past problems and new potential leaders.

- How can electric school buses be used to help students, or future students, with disabilities who have been left behind? For example, those punished for absences caused by not having accessible transportation.
- How can youth advocates with disabilities be provided with more leadership opportunities in the electric transition of school buses?

Close out

As we come to a close, we'd like to check in on ways to stay connected and continue this work.

- Is there anything that we're missing or didn't address?
- How can a project like this continue to support students with disabilities?
- What additional needs, priorities, or interests should we consider?

Closing comments

This concludes the survey. Thank you for your participation and your time. The information you have provided is extremely valuable to our research. Please reach out to us if you have any follow-up thoughts or questions.

Appendix E. Parents and professionals survey

Project background

To give you some background on the organization behind this survey, World Resources Institute (WRI) is a global nonprofit organization that works with leaders in government, business, and civil society to research, design, and carry out practical solutions that simultaneously improve people's lives and ensure that nature can thrive. In 2020, WRI was awarded a \$30 million gift by the Bezos Earth Fund to launch the Electric School Bus Initiative (ESB Initiative). In collaboration with partners and communities, WRI's ESB Initiative aims to build unstoppable momentum toward the equitable transition of the US school bus fleet to electric by 2030, bringing health, climate, and economic benefits to children and families across the country. The ESB Initiative seeks to engage with the broader constellation of e-bus stakeholders to influence and build on growing electrification momentum by offering technical assistance to school districts, convening industry experts in working groups, collecting data, providing analysis for research dissemination, advocating for policies at the federal and state level, and engaging in a variety of partnerships with environmental, equity, and community organizations. The ESB Initiative centers equity in all its work.

The goal of this survey is for us to gain a better understanding of

- current knowledge gaps in disability rights and justice and ways to support existing efforts to center transportation equity and inclusion overall;
- background on the current status of transportation access for students with disabilities with regard to school bus electrification;
- recommendations for the ESB Initiative's work with students, parents, school districts, school bus manufacturers, and policymakers in support of disability rights and justice;
- information that advances the goal of equitably electrifying the US school bus fleet, with particular attention paid to inclusion for students with disabilities;
- multipurpose usage of electric school buses that offers additional support for people with disabilities;
- benefits and barriers faced by the disability community regarding the transition to electric buses; and

- intersectional considerations: the combination of multiple factors such as geography, race, gender, and income levels related to students' disabilities and ways to steer to a more just transition.

A research paper will be developed primarily for the ESB Initiative's internal use but will also be shared publicly to inform other stakeholders.

Grounding

Disclaimer: Multiple assessment factors are used to determine a student's disability. However, many students of color, students in low-income areas, and immigrant families face inequitable access to obtaining requisite diagnostic testing and medical documentation. These metrics also do not account for alternative ways of validating "embodied knowledge" concerning body-mind awareness, family histories, and daily experiences. For the purposes of this survey, and the research paper that it will inform, the phrases "students with disabilities" and "adults with disabilities" will refer, but are not limited, to those with

- physical or mobility disabilities;
- cognitive or intellectual disabilities;
- hearing loss or deafness;
- vision loss or blindness;
- deaf-blindness;
- speech or communication disabilities;
- learning disabilities;
- mental health or psychiatric disabilities;
- traumatic brain injuries;
- autism; and/or
- chronic illnesses.

Please note: "I don't know" or "n/a (not applicable)" are also suitable responses to the required questions below. It is completely fine if you are simply unsure of how to answer or don't feel comfortable responding to a question outside of your experience, expertise, or awareness. It is also okay to copy any questions you want more time with and send an email with responses after you have submitted the survey.

- Name
- Email

Inclusion, intersectionality, and impacts

Let's start with inclusion, intersectionality, and impacts on students with disabilities during the transition to electric school buses.

- How can key actors (such as school districts, school bus manufacturers, and policymakers) involved in the transition to electric school buses ensure that the needs, rights, and participation of students and adults with disabilities are included?
 - *Prompts:* Share how students and people with disabilities can be involved with decision-making processes throughout the electric school bus transition. Share how relevant information can be offered in accessible formats. Identify the communication channels that exist for students and adults with disabilities to share their transportation thoughts, concerns, or dreams.
- What are the challenges faced by the disability community, including students with disabilities in rural, urban, and Tribal areas, concerning the transition to electrify the US school bus fleet? How are students of color with disabilities and students with disabilities in low-income areas uniquely impacted by this transition?
 - *Prompts:* Share any stories about electric school bus transition challenges. Share the most pressing concerns for students and adults with disabilities in the areas you serve and/or live in.
- What are the effects of school bus electrification for students and nonstudents with a broad range of disabilities, including physical and nonphysical? Specifically, what are the potential health effects from air pollution, changes in road traffic, sound conditions on the bus, and others?
 - *Prompts:* Provide examples of pollution (air and noise) impacts on students with disabilities. Identify how electric buses reduce transportation and health risks for students with disabilities. Identify any negative effects of implementing electric buses for students with disabilities or the greater community with disabilities.

Use and access

Next, we'd like to learn more about the uses of electric school buses and the importance of access.

- What are the effects transitioning fleets may have on the multiple uses of school buses and how does this intersect with transportation access for the disability community outside of school-related activities?
 - *Prompts:* Provide examples of the type of community activities you think the electric buses can be used for. Share any

examples of cities or counties with plans to use the electric buses for activities outside of schools (e.g., as power sources, emergency evacuations, park and rides).

- What design makes an electric school bus accessible, or inaccessible, for students with disabilities and how common are these features among school buses that have transitioned or intend to transition?
 - *Prompts:* Provide examples of features that make a school bus comfortable, safe, and easy to access for students with disabilities. Provide examples of features that make a school bus uncomfortable, unsafe, and difficult to access for students with disabilities. Share any types of changes that would enhance their transportation experiences.
- In what ways can the transition to electric buses serve students with disabilities who either don't have access to school-related activities or have dropped out due to challenges around transportation access?
 - *Prompts:* Share how accessible electric buses can be used differently than diesel buses to make sure students have access to all school activities. Provide examples of the types of outreach that can be done to connect with students who have dropped out to inform them that new transportation options might be available. Identify how school districts can assure students with disabilities that electric buses will actually enhance their access to school activities.

Harm and hope

Now, let's discuss past harms and new potential leaders.

- How can the transition to electric buses be used to rectify the harm of students, or prospective students, with disabilities being left behind? For example, those penalized or criminalized due to truant-related offenses that stem from a lack of accessible transit.
 - *Prompts:* Share how you do or do not think current truancy policies recognize transportation barriers for students with disabilities. Share ideas on how schools can adjust their attendance policies to make sure students with disabilities aren't punished for a lack of accessible transportation options. Share how student records and other documentation can address past attendance issues so that a student's educational future isn't negatively impacted.
- How can youth climate and transportation justice leaders with disabilities be provided with more opportunities to equitably engage on the electric transition of school buses?
 - *Prompts:* Share any programs or positions where youth with disabilities are already serving as leaders in the electric

school bus transition. Identify specific programs, processes, or positions where they should have more leadership.

Close out

As this survey comes to a close, we'd like to check in on the evolution and continuation of this work.

- Is there any angle or aspect of this issue that we're missing or didn't address?
- How can a project such as this further support students with disabilities? What additional needs, priorities, or interests should WRI and Equitable Cities consider?

Closing comments

This concludes the survey. Thank you for your participation and your time. The information you have provided is extremely valuable to our research. Please reach out to us if you have any follow-up thoughts or questions.

ENDNOTES

1. The Electric School Bus Initiative defines a “committed” electric school bus as a bus in any of the four stages of adoption: awarded, ordered, delivered, or operating. The initiative considers an electric school bus to be “committed” starting when a school district or fleet operator has been awarded funding to purchase it or makes a formal agreement to purchase it from a manufacturer—not when a district has only expressed intent to acquire a bus.

For the ESBs committed and the remaining US school bus fleet, the authors were unable to locate data on the share of school buses with accessibility features.
2. In the 1970s, more than 1 million young people with disabilities were excluded from school. Only one in five disabled children was in the public school system (Dudley-Marling and Burns 2014).
3. Based on the experience of one youth reviewer, continued bus segregation of students with disabilities could also result in shorter routes with fewer stops.
4. Please see “Next stop, access! Before you read” for the complete definition of *disability justice* and *environmental justice* and the lists of their respective principles.
5. Established under the Individuals with Disabilities Education Act (IDEA), an Individualized Education Program (IEP) is a personalized plan designed for students with disabilities in the US education system. It outlines specific educational goals, accommodations, and services tailored to meet the unique needs of each student. The IEP is developed collaboratively by educators, parents, and sometimes the students themselves. It serves as a roadmap to ensure that the student receives appropriate support and access to education (US Department of Education 2017).
6. As of the spring of 2024, funding programs that include additional funds for procurement of an ESB with a lift include the EPA’s CSBP (EPA 2024a), the EPA’s Clean Heavy-Duty Vehicles Program (EPA 2024b), New York’s School Bus Incentive Program (NY-SERDA 2024), Michigan’s Clean Bus Energy Grant (MAPT 2024), and California’s Hybrid and Zero Emission Truck and Bus Voucher Incentive Project (HVIP) (CA HVIP 2023). Furthermore, California’s Zero-Emission School Bus and Infrastructure (ZESBI) grant is planning to include additional funding in its next round, according to previous working group conversations. (Note that FY23 round 1 of ZESBI did not include additional funds for lifts; CEC 2024.)
7. It is also important to note that potholes and street cracks can be largely caused by oil leaks and fuel from internal combustion vehicles (Havelka 2023).
8. According to the American Public Transportation Association, *universal design* is defined as “the design of equipment, environments and services to be usable by all people, to the greatest extent possible, without the need for adaption [*sic*] or specialized design regardless of gender, ethnicity, health, size, ability, disability or other factors that may be pertinent. Universal design is the implementation of a process that improves the quality of life and greatly improves independence by enabling and empowering a general, yet diverse, world population to achieve optimal human performance, health and wellness through equal access to all facilities and social participation” (APTA 2020).
9. In contrast, one youth reviewer of this research noted that she felt far more comfortable and safer on segregated buses, due to overcrowding and incidents of violence on integrated buses.
10. Older school buses may be retrofitted and also used to transport individuals in psychiatric facilities, juvenile detention centers, ICE detention centers, jails, and prisons (National Bus Sales n.d.).
11. Please see “Next stop, access! Before you read” for the full list of disability justice principles.

REFERENCES

- Agyei-Okyere, E., M.P. Opoku, and W. Nketsia. 2019. "An Assessment of the Living Conditions of Disabled People in Mining Communities: A Case Study of Ghana." December 6. <https://www.sciencedirect.com/science/article/abs/pii/S2214790X18303034>.
- Alfonseca, K. 2023. "After Disabled 6-Year-Old Dies on Bus Ride to School, Parents Speak Out about Safety Concerns." ABC News, August 4. <https://abcnews.go.com/US/after-disabled-6-year-dies-bus-ride-school/story?id=101956728>.
- APTA (American Public Transportation Association). 2020. "Transit Universal Design Guidelines: Principles and Best Practices for Implementing Universal Design in Transit." July 28. APTA-SUDS-UD-GL-010-20.pdf.
- Berne, P., A.L. Morales, D. Langstaff, and Sins Invalid. 2018. "Ten Principles of Disability Justice." *WSQ: Women's Studies Quarterly* 46 (1): 227–30. doi:10.1353/wsqr.2018.0003.
- Block, S. 2021. "Mining Energy-Transition Metals: National Aims, Local Conflicts." MSCI blog, June 3. <https://www.msci.com/www/blog-posts/mining-energy-transition-metals/02531033947>.
- Bradley, K. 2022. "The Socioeconomic Achievement Gap in the U.S. Public Schools." Ballard Center for Social Impact. <https://ballardbrief.byu.edu/issue-briefs/the-socioeconomic-achievement-gap-in-the-us-public-schools>.
- BraunAbility. 2023. "Can Zero Emission Bus Public Transportation Accommodate Wheelchairs?" <https://www.braunability.com/us/en/commercial/white-papers/zero-emission-bus-zeb.html>.
- Brown, C.T., and A. Curran. 2023. "Electric School Bus Initiative Advocacy Stakeholder Analysis: A Baseline Report." World Resources Institute, July. <https://www.wri.org/research/electric-school-bus-initiative-advocacy-stakeholder-analysis-baseline-report>.
- Bryant, J., D. Pinder, N. Yancy, E. Liss, and G. Rawson. 2023. "Advancing Racial Equity in US Pre-K–12 Education." McKinsey & Company, September 13. <https://www.mckinsey.com/industries/education/our-insights/advancing-racial-equity-in-us-pre-k-12-education>.
- CA HVIP (California Clean Truck and Bus Voucher Incentive Project). 2023. "Appendix G Public School Bus Set-Aside." <https://california-hvip.org/wp-content/uploads/2023/06/HVIP-PSBSA-FY22-23-Appendix-G-FINAL.pdf>.
- Campbell-Stephens, R.M. 2021. *Educational Leadership and the Global Majority: Decolonising Narratives*. London: Springer Nature.
- Catalo, H. 2023. "Bus Aide Attacked Special Needs Student; Mom Says Ann Arbor School Hid Incident for Weeks." WXYZ, August 1. <https://www.wxyz.com/news/local-news/investigations/bus-aide-attacked-special-needs-student-mom-says-ann-arbor-school-hid-incident-for-weeks>.
- CDC NCEH (Centers for Disease Control and Prevention's National Center for Environmental Health). 2023. "Most Recent National Asthma Data: CDC." May 10. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm.
- CEC (California Energy Commission). 2024. "Work Group #2 to Discuss the SB 114 Grants for Zero-Emission School Buses and Infrastructure." April 3. https://www.energy.ca.gov/sites/default/files/2024-03/Work_Group_%232_to_Discuss_the_SB_114_Grants_for_Zero-Emission_School_Buses_and_Infrastructure_Presentation_ada.pdf.
- Chason, R., and I. Godfrey. n.d. "In Scramble for EV Metals, Health Threat to Workers Often Goes Unaddressed." *Washington Post*, June 8. <https://www.washingtonpost.com/world/interactive/2023/ev-mineral-manganese-south-africa/>.
- Civil Rights Division. 2022. "ADA Enforcement." US Department of Justice, June. https://archive.ada.gov/enforce_current.htm.
- Civil Rights Division. 2023. "Disability Rights Cases." US Department of Justice. <https://www.justice.gov/crt/disability-rights-cases>.
- Collins, P.H. 2000. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. 2nd ed. New York: Routledge.
- Cordes, S.A., C. Rick, and A.E. Schwartz. 2022. "Can School Buses Improve Access for Students without Driving Down Academic Outcomes?" Brookings, June 22. <https://www.brookings.edu/articles/can-school-buses-improve-access-for-students-without-driving-down-academic-outcomes/>.
- Crenshaw, K. 1989. "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics." *University of Chicago Legal Forum*, no. 1. <https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=1052&context=ucfl>.
- DRA (Disability Rights Advocates). 2023. "M.F. v. NYC Department of Education." April 21. <https://dralegal.org/case/m-f-v-new-york-city-department-of-education/>.
- Dudley-Marling, C., and M.B. Burns. 2014. "Two Perspectives on Inclusion in the United States." *Global Education Review* 1 (1): 14–31.
- Ekbatani, T. 2024. "A Smoother, Quieter Ride for Students with Special Needs." *School Transportation News (STN)* 34 (1) (January). <https://content.yudu.com/web/1qiu9/0A1rp8i/jan24/html/index.html?page=18&origin=reader>.
- EPA (US Environmental Protection Agency). 2024a. "2023 Clean School Bus Rebates Program Guide: May 2024 Update." May. <https://www.epa.gov/system/files/documents/2024-05/420b24034.pdf>.
- EPA. 2024b. "Clean Heavy-Duty Vehicles Grants." April. <https://www.epa.gov/system/files/documents/2024-04/2024-chdv-grants-nofo-2024-04.pdf>.

FHWA (Federal Highway Administration). 2017. 2017 National Household Travel Survey. Washington, DC: US Department of Transportation. <https://nhts.ornl.gov>.

First National People of Color Environmental Leadership Summit. 1991. "The Principles of Environmental Justice." October 27. <https://www.ejnet.org/ej/principles.pdf>.

Freehafer, L., and L. Lazer. 2024. "A Dataset of Electric School Bus Adoption in the United States." World Resources Institute, May. https://datasets.wri.org/dataset/electric_school_bus_adoption.

GAO (Government Accountability Office). 2022. "K-12 Education: Student Population Has Significantly Diversified, but Many Schools Remain Divided along Racial, Ethnic, and Economic Lines." August 30. <https://www.gao.gov/products/gao-22-104737>.

GBA (Global Battery Alliance). n.d. "GBA Battery Passport." <https://www.globalbattery.org/battery-passport/>.

Gilroy, J., M. Uttjek, L. Lovern, and J. War. 2021. "Indigenous People with Disability: Intersectionality of Identity from the Experience of Indigenous People in Australia, Sweden, Canada, and USA." *Disability and the Global South* 8: 2071–93.

Griffin, E. 2023. "Protestors Rally for Electric Buses at School Board Offices." MoCo360, November 3. <https://moco360.media/2023/11/02/protestors-rally-for-electric-buses-at-school-board-offices/>.

Havelka, T. 2023. "How Long Does It Take for Oil to Damage Asphalt?" Liquid Image. <https://www.liquidimageco.com/how-long-does-it-take-for-oil-to-damage-asphalt/>.

Howley, C. 2001. "The Rural School Bus Ride in Five States: A Report to the Rural School and Community Trust." August 20. Athens: ERIC Clearinghouse on Rural Education and Small Schools and Ohio University. <http://oak.cats.ohiou.edu/~howleyc/howleyc.htm>.

HUD (US Department of Housing and Urban Development). 2023. "Fact Sheet: 2023 Annual Homelessness Assessment Report, Key Findings from the Point-in-Time Counts." https://www.hud.gov/sites/dfiles/PA/documents/Fact_Sheet_Summarized_Findings.pdf.

IHRB (Institute for Human Rights and Business). 2022. "What Is Free, Prior and Informed Consent (FPIC)?" Institute for Human Rights and Business, December 13. <https://www.ihrb.org/explainers/what-is-free-prior-and-informed-consent-fpic>.

Konkel, L. 2015. "Racial and Ethnic Disparities in Research Studies: The Challenge of Creating More Diverse Cohorts." *Environmental Health Perspectives* 123 (12): A297–A302. <https://doi.org/10.1289/ehp.123-A297>.

Levinson, M., and A. Achury. 2024. "Clearinghouse: Electric School Bus Funding and Financing Opportunities." World Resources Institute, January 12. <https://electricschoolbusinitiative.org/clearinghouse-electric-school-bus-funding-and-financing-opportunities>.

Lincoln, M. 2015. "State Officials: Majority of Kaka'ako Homeless Are COFA Migrants." Hawaii News Now, May 13. <https://www.hawaiinewsnow.com/story/29049224/state-officials-majority-of-kakaako-homeless-are-cofa-migrants>.

Liu, N.M., and J. Grigg. 2018. "Diesel, Children and Respiratory Disease." *BMJ Paediatrics Open* 2 (1): e000210. doi:10.1136/bmjpo-2017-000210.

Logan, J.R., W. Zhang, and D. Oakley. 2017. "Court Orders, White Flight, and School District Segregation, 1970–2010." *Social Forces* 95: 1049–75.

MAPT (Michigan Association for Pupil Transportation). 2024. "Section 74(b), Clean Bus Energy Grant." <https://mapt.org/sec-74-clean-school-bus-grant/?apcid=0065a83d5cd8c2c5be810900>.

Martin, E. 2023. "'Dehumanizing' Experiences Lead Disabled Student to Demand Improved Bus Accessibility." *Daily Tar Heel*, March 21. <https://www.dailytarheel.com/article/2023/03/city-chapel-hill-transit-accessibility-issues>.

Mattke, R., K. Delegard, and D. Leebaw. 2022. "Mapping Prejudice: The Map Library as a Hub for Community Co-creation and Social Change." *Journal of Map and Geography Libraries* 18 (1–2): 1–21.

Morello-Frosch, R., and B.M. Jesdale. 2006. "Separate and Unequal: Residential Segregation and Estimated Cancer Risks Associated with Ambient Air Toxics in U.S. Metropolitan Areas." *Environmental Health Perspectives* 114 (3): 386–93. <https://doi.org/10.1289/ehp.8500>.

Moses, E., and C.T. Brown. 2022. "Equity Framework to Guide the Electric School Bus Initiative." Working Paper. Washington, DC: World Resources Institute. <https://doi.org/10.46830/wriwp.22.00047>.

NADTC (National Aging and Disability Transportation Center). 2023. "ADA and Paratransit." Federal Transit Administration. <https://www.nadtc.org/about/transportation-aging-disability/ada-and-paratransit/>.

National Bus Sales. n.d. "What Happens to Used Buses When They Are Retired." <https://nationalbus.com/what-happen-to-used-buses-when-they-are-retired/>.

Nelson, R.K., L. Winling, et al. 2023. "Mapping Inequality: Redlining in New Deal America." In *American Panorama: An Atlas of United States History*, edited by Robert K. Nelson and Edward L. Ayers. <https://dsl.richmond.edu/panorama/redlining>.

Newell, M., and B. Dickerson. 2022. "S.C. School District Pays \$2M to Settle Lawsuit after Child with Autism Attacked on School Bus, Attorney Says." WBTB, September 1. <https://www.wbtv.com/2022/09/01/sc-school-district-pays-2m-settle-lawsuit-after-child-with-autism-attacked-school-bus-attorney-says/>.

New York City Council. 2021. "Local Laws of the City of New York for the Year 2021," no. 120. November 8. <https://nyc.legistar1.com/nyc/attachments/b72e3b32-5da6-4cff-979a-7a5b0a5cf557.pdf>.

- New York State Assembly. 2022. "Summary of Recommended Changes to the Executive Budget State Fiscal Year 2022-23." https://nyassembly.gov/Reports/WAM/2022summary_changes/2022summary.pdf.
- NHTSA (National Highway Traffic Safety Administration). n.d. "School Bus Safety." <https://www.nhtsa.gov/road-safety/school-bus-safety>.
- NYSERDA (New York State Energy Research and Development Authority). 2024. "NY School Bus Incentive Program Overview." <https://www.nyserda.ny.gov/All-Programs/Electric-School-Buses/NY-School-Bus-Incentive-Program-Overview>.
- OCR (Office of Civil Rights). 2023a. "The Civil Rights of Students with Hidden Disabilities and Section 504." US Department of Education, July 21. <https://www2.ed.gov/about/offices/list/ocr/docs/hq5269.html>.
- OCR. 2023b. "Protecting Students with Disabilities: Frequently Asked Questions about Section 504 and the Education of Children with Disabilities." US Department of Education, July 18. <https://www2.ed.gov/about/offices/list/ocr/504faq.html#introduction>.
- O'Hagan, M. 2021. "U.S. Cities Are Being Sued over Sidewalk Accessibility." *Time*, October 12. <https://time.com/6105909/sidewalk-accessibility-lawsuits/>.
- O'Neil, J., B.D. Hoffman, and Council on Injury, Violence, and Poison Prevention. 2018. "School Bus Transportation of Children with Special Health Care Needs." *Pediatrics* 141 (5): e20180513. <https://doi.org/10.1542/peds.2018-0513>.
- OSERS (Office of Special Education and Rehabilitative Services). 2000. "A Guide to the Individualized Education Program." US Department of Education, July. <https://www2.ed.gov/parents/needs/speced/iepguide/iepguide.pdf>.
- Owen, J.R., D. Kemp, A.M. Lechner, J. Harris, R. Zhang, and É. Lèbre. 2022. "Energy Transition Minerals and Their Intersection with Land-Connected Peoples." *Nature*, December 1. <https://www.nature.com/articles/s41893-022-00994-6>.
- Peña, M. 2022. "Chicago Schools Bus Woes Continue with Long Commutes for 365 Students with Disabilities." Chalkbeat Chicago, August 24. <https://chicago.chalkbeat.org/2022/8/24/23320764/chicago-public-schools-transportation-problems-bus-driver-pedro-martinez>.
- Porter, A. n.d. "Rethinking the Achievement Gap." University of Pennsylvania Graduate School of Education. <https://www.gse.upenn.edu/news/rethinking-achievement-gap>.
- Ramirez, S. 2022. "Parents Concerned over \$9.7 Million MCPS Emergency School Bus Purchase." FOX 5 DC, August 22. <https://www.fox5dc.com/news/parents-concerned-over-9-7-million-mcps-emergency-school-bus-purchase>.
- Rogers, E. 1962. *Diffusion of Innovations*. New York: Free Press of Glencoe.
- Ross, T., P. Bilas, R. Buliung, and A. El-Geneidy. 2020. "A Scoping Review of Accessible Student Transport Services for Children with Disabilities." *Transport Policy* 95 (June 5) : 57-67. <https://doi.org/10.1016/j.tranpol.2020.06.002>.
- Rothstein, R. 2018. *The Color of Law*. New York: Liveright.
- RRI (Rights and Resources Initiative). n.d. Website. Accessed May 2024. <https://rightsandresources.org/>.
- Sainato, M. 2023. "'We Were Not Consulted': Native Americans Fight Lithium Mine on Site of 1865 Massacre." *Guardian*, October 13. <https://www.theguardian.com/us-news/2023/oct/13/native-americans-1865-massacre-lithium-mine-thacker-pass#:~:text=Lithium%20mining%20operations%20in%20Chile,try%20to%20stop%20the%20project>.
- Sawyer, I. 2022. "Child Labor and Human Rights Violations in the Mining Industry of the Democratic Republic of Congo: Testimony of Ida Sawyer at the Tom Lantos Human Rights Commission." Human Rights Watch, July 14. <https://www.hrw.org/news/2022/07/14/child-labor-and-human-rights-violations-mining-industry-democratic-republic-congo>.
- Schaeffer, K. 2023. "What Federal Education Data Shows about Students with Disabilities in the U.S." Pew Research Center, July 24. <https://www.pewresearch.org/short-reads/2023/07/24/what-federal-education-data-shows-about-students-with-disabilities-in-the-us/>.
- School Bus Fleet. 2020. "2021 FACT BOOK: Pupil Transportation by the Numbers." *School Bus Fleet Magazine* 66 (11). <https://schoolbusfleet.mydigitalpublication.com/publication/?i=696373&p=1&pp=1&view=issueViewer>.
- SCOTUS (Supreme Court of the United States). 1971. "*Swann v. Charlotte-Mecklenburg Board of Education*, 402 U.S. 1." Justia Law. <https://supreme.justia.com/cases/federal/us/402/1/>.
- Siegler, K. 2023. "Western Tribes' Last-Ditch Effort to Stall a Large Lithium Mine in Nevada." National Public Radio, June 28. <https://www.npr.org/2023/06/28/1184812267/western-tribes-last-ditch-effort-to-stall-a-large-lithium-mine-in-nevada>.
- Sins Invalid. 2015. "10 Principles of Disability Justice." September 17. <https://www.sinsinvalid.org/blog/10-principles-of-disability-justice>.
- Smith, L.T. 2012. *Decolonizing Methodologies: Research and Indigenous Peoples*, 2nd ed. London: Zed.
- Southwest ADA Center. 2018. "Disability Rights Laws in Public Primary and Secondary Education: How Do They Relate?" ADA National Network. <https://adata.org/factsheet/disability-rights-laws-public-primary-and-secondary-education-how-do-they-relate>.
- US Access Board. 2023. "Design Recommendations for Accessible Electric Vehicle Charging Stations." July 17. <https://www.access-board.gov/tad/ev/>.

US Access Board. n.d. "Guide to the ADA Accessibility Standards." <https://www.access-board.gov/ada/guides/chapter-1-using-the-ada-standards/>.

US Census Bureau. 2020. "Montgomery County, Maryland." https://data.census.gov/profile/Montgomery_County,_Maryland?g=050XX00US24031#race-and-ethnicity.

US Department of Education. 2017. "Sec. 300.320 Definition of Individualized Education Program." July 12. <https://sites.ed.gov/idea/regs/b/d/300.320>.

Venkataram, P.S., J.A. Flynn, G. Circella, and D. Sperling. 2023. "Challenges Faced by People with Disabilities in Public and Active Transportation Systems in the United States of America." University of California, Davis: 3 Revolutions Future Mobility Program. <http://dx.doi.org/10.7922/G2HX1B17> Retrieved from <https://escholarship.org/uc/item/1jc653r5>.

Voulgaris, C.T., M.J. Smart, and B.D. Taylor. 2019. "Tired of Commuting? Relationships among Journeys to School, Sleep, and Exercise among American Teenagers." *Journal of Planning Education and Research* 39 (2): 142-54. <https://doi-org.dist.lib.usu.edu/10.1177/0739456X17725148>.

White House. 2022. "FACT SHEET: Biden-Harris Administration Proposes New Standards for National Electric Vehicle Charging Network." June 9. <https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/09/fact-sheet-biden-harris-administration-proposes-new-standards-for-national-electric-vehicle-charging-network/>.

WRI (World Resources Institute). 2024. "Land and Resource Rights Project." May. <https://www.wri.org/initiatives/land-and-resource-rights>.

ACKNOWLEDGMENTS

The research team would like to express sincere gratitude to everyone who has contributed to this paper. Your views and visions were invaluable. Thank you for your time, talent, and tenderness throughout this process.

This publication was made possible thanks to the support of the Bezos Earth Fund, which provides funding for the Electric School Bus Initiative. The authors wish to thank the many people who offered their time and expertise to review and provide comments on the many iterations of this paper. Collaborators who provided invaluable insights and expertise include Alejandra Achury, Emmett Werthmann, and Vishant Kothari. Internal reviewers who provided comments on the first manuscript draft include Amy Todd, Brian Zepka, Brittany Barrett, Carla Walker, Elizabeth Moses, Gregory Kresge, Jesse Worker, Katherine Roboff, Natalia Akopian, Sebastian Castellanos, Sophie Young, Stephanie Ly, and Sue Gander. The authors are equally grateful for those who reviewed this published document. Internal reviewers who provided helpful guidance include Amy Todd, Carla Walker, Carlos Muñoz-Peña, Justyn Huckleberry, Katherine Roboff, Meredith Epstein, Natalie Elwell, Sarah Huckins, Simone Athayde, and Sue Gander. External reviewers who provided invaluable insights include Carol Tyson, Sahana Godbole Chaudhuri, and Tinuke Abayomi-Paul. We also thank Carla Walker and Sue Gander for their leadership throughout the process, Brian Zepka for their generous support in editing, Kate Archambault for finance and operations support, Shannon Collins for graphic and layout support, Romain Warnault for publication coordination, and Renee Pineda for shepherding the review process. The authors would like to express their deepest gratitude to our editor, Sophie Young, whose research support, insightful feedback, and meticulous editing greatly enhanced the quality of this work.

ABOUT THE AUTHORS

Lead collaborator and coauthor

Justice Shorter is an expert on issues at the intersection of race, disability, gender, climate, and crises. Shorter is the former National Disaster Protection Advisor for America's Protection & Advocacy System and has served as a Disability Integration Advisor with the US Federal Emergency Management Agency, deploying frequently to disaster areas across the United States and its territories. She has cocreated a celebrated framework for applying disability justice approaches to disaster and humanitarian assistance, a crisis management method that acknowledges histories of harm, centers intersectionality, and prioritizes leadership by Black, Indigenous, and People of Color with disabilities. Shorter recently formed SeededGround, a content-creation and consulting firm. Her work is lovingly wedded to bringing disabled dreams to fruition and is rooted in a long lineage of BIPOC dreamers, artists, facilitators, teachers, and advocates.

Coauthor and researcher

Valerie Novack is a disability rights advocate and disability policy researcher. Novack is a researcher focusing on negative and discriminatory outcomes of policies and procedures in housing, transportation, public access, and emergency management. Novack has partnered with nonprofits, academic institutions, and governmental agencies to create common practices and legislative goals that increase safety, access, and equity for people with disabilities in the United States.

Coauthor and researcher

Alyssa Curran is an E-Mobility Financial Solutions and Equity Research Associate with World Resources Institute's Electric School Bus (ESB) Initiative. In this role, she concentrates on areas of funding and financing, and equity and justice research and engagement. Her work supports the advancement of the equitable transition to electric school buses.

ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our approach

COUNT IT

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.

ABOUT ELECTRIC SCHOOL BUS INITIATIVE

In 2020, WRI was awarded a \$30 million gift by the Bezos Earth Fund to launch the **Electric School Bus Initiative** (ESB Initiative). In collaboration with partners and communities, WRI's ESB Initiative aims to build unstoppable momentum toward the equitable transition of the US school bus fleet to electric by 2030, bringing health, climate, and economic benefits to children and families across the country. The ESB Initiative seeks to engage with the broader constellation of e-bus stakeholders to influence and build on growing electrification momentum by offering technical assistance to school districts, convening industry experts in working groups, collecting data, providing analysis for research dissemination, advocating for policies at the federal and state level, and engaging in a variety of partnerships with environmental, equity, and community organizations.

ABOUT SEEDEDGROUND

SeededGround, formed by Justice Shorter, is an agency devoted to content creation that centers people with disabilities in general and people of color with disabilities in particular. We sow justice and harvest dreams through projects that are imaginative and intersectional. Projects are curated in consideration of community needs, creative capacities, and client requests. Our portfolio is composed of projects that involve accessibility standards and practices, cultural work, advocacy campaigns, cross-movement organizing, multimedia productions, strategic and operational plans, research studies, generative gatherings, and archival efforts. Our work is lovingly wedded to world-building disabled dreams to fruition.



Copyright 2024 World Resources Institute. This work is licensed under the Creative Commons Attribution 4.0 International License. To view a copy of the license, visit <http://creativecommons.org/licenses/by/4.0/>