

Zero-Emission Vehicle Awareness & Education

Towards inclusive and equitable outcomes in a decarbonized MHDV sector

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The Pembina Institute acknowledges that the work we steward and those we serve is spans across many Nations. We respectfully acknowledge the space our organization is headquartered in, as, the traditional and ancestral territories of the Blackfoot Confederacy, comprised of the bands Siksika, Piikani, and Kainai, the Îyârhe Nakoda Nations, including the bands of Goodstoney, Chiniki, and Bearspaw, and the Tsuut’ina Dené. These Lands are also home to the Métis Nation of Alberta – Region 3 whose Peoples.

These acknowledgements are some of the beginning steps on a journey of several generations. We share them in the spirit of truth, justice, reconciliation, and to contribute to a more equitable and inclusive future for all of society.

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Executive summary

In addition to pursuing a combination of investments and regulations to support Canadians and industry in the transition to zero-emission vehicles (ZEVs), Canada's Zero Emission Vehicle Awareness Initiative (ZEVAI) aims to address a current lack of awareness, knowledge, and confidence in ZEVs in order to accelerate widespread adoption. Among other programs, ZEVAI aims to ensure the transition to ZEVs is equitable and that uptake is accessible to Canadians in all regions of the country.

Pembina Institute's 2022 report *Zero-Emission Vehicle Awareness, Education and Engagement*, explored opportunities to advance diversity, equity, and inclusion in ZEVAI projects within the passenger vehicle market. Despite increasing education and engagement efforts to advance ZEV uptake for personal mobility, less is known about how to communicate the benefits of ZEVs and encourage adoption among fleet operators within the medium- and heavy-duty vehicle (MHDV) sector. Following our 2022 report, this report seeks to uncover how Natural Resources Canada's ZEVAI program and future projects can effectively engage commercial MHDV fleets owned and/or operated by women, racialized or Indigenous peoples, and/or those living and working in rural and northern communities. For the purpose of this report, we refer to this cohort of fleet operators as underrepresented and underserved groups.

Bringing together literature from new and emerging research, and interview insights with representatives from the commercial MHDV industry and subject matter experts in ZEV programming, this report uncovers gaps and opportunities for ZEV awareness and education outreach with underrepresented and underserved fleets.

Barriers to ZEV adoption and access to ZEV education and awareness programs

- **Fleets experience thin margins and limited access to capital** and financing.
- **Many fleets acquire used MHDVs** and there is currently not a strong secondary ZEV market.
- **Barriers to accessing charging infrastructure** may include limited or no access to a yard or depot, and a tendency to rent or lease property.
- **Fleets tend to lack time and capacity** to research ZEVs due to minimal staffing and spending much of their time on the road.
- Current awareness and education materials are predominately in English, posing language barriers to diverse groups.

- **Information tends to be complex, and highly technical** which excludes groups with varying educational backgrounds.
- **There is a lack of inclusive imaging and case studies** that resonates with underrepresented and underserved groups.
- **Most efforts to deploy ZEVs in the sector focus on the big players**, where pilot projects are almost exclusively conducted with large, well-capitalized fleets.
- **The fragmented nature of the MHDV sector makes outreach challenging**, and there is minimal data to identify underrepresented and underserved groups.

DEI framework for medium- and heavy-duty ZEV engagement

Reaching underrepresented and underserved fleets in the sector requires integrating considerations of diversity, equity and inclusion in ZEAVI. As such, we propose a DEI framework (see Section 4.2) for ZEV engagement within the MHDV sector for prospective ZEVAI projects and have developed recommendations for Natural Resources Canada. The ability for ZEVAI projects to integrate DEI-related practices will vary depending on project scope and size. Most importantly, prospective ZEVAI projects should build the costs of DEI-practices into their project budgets at the early planning stage.

ZEVAI projects

1. Indicate **if the project will directly serve a community** classified as being underrepresented and/or underserved within the sector, or how a project focused on the public at large will inform and consider such groups within the sector.
2. Demonstrate that the project team has a **clear understanding of the target community's context, history, and intersectionalities**, including how this might impact and shape the engagement approach and scope of educational and awareness-based information.
3. Use engagement and outreach strategies that incorporate a **range of media outlets**, inclusive images and case studies and translation into diverse languages.
4. Create opportunities to **meet communities where they are at**, and where possible provide firsthand zero-emission MHDV experiences.
5. **Partner** with community-based organizations (such as the Canadian Centre for Diversity and Inclusion, Women Business Enterprises Canada Council, Association for New Canadians and other non-profit, charitable organizations), local champions, diverse trucking associations (such as Women in Trucking,

- DESI Trucking Association, South Asian Trucking Association of Canada etc.), dealers, and/or others to extend engagement with underrepresented and/or underserved groups in the sector.
6. Practice **authentic engagement** over performative engagement by setting and communicating clear goals and expectations, avoiding biases, integrating flexibility into project design, and facilitating open feedback channels.
 7. Provide **reimbursements** to remove financial barriers to participation.
 8. Develop, measure and report on DEI-related **key performance indicators**.
 9. To the extent possible, seek out ways to couple project goals with **supporting benefits to the wider community**.

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1. Continue to support **ongoing research** for the development of DEI-related practices that can support equitable and inclusive outcomes within ZEVAI.
2. Consider how to **adequately fund** ZEVAI projects to incorporate DEI elements into engagement and outreach practices.
3. Move toward facilitating a common understanding of underrepresented and underserved groups within the MHDV sector through the **collection and provision of data**.
4. Explore other opportunities to **integrate DEI elements** into ZEV related programs and supports within the MHDV sector, drawing from emerging practices summarized in Appendix A, Table 3.

1. Introduction

The Medium- and Heavy-Duty Vehicle (MHDV) sector is a key facilitator of economic growth in Canada but is also a major contributor to greenhouse gas (GHG) emissions. Currently, nearly half of transportation emissions in Canada stem from MHDVs, and due to a growing fleet and increasing vehicle kilometers travelled, emissions continue to rise.¹ Despite projections indicating a rapid reduction in emissions from light-duty vehicles over the next 20 years, if current trends continue, MHDVs are projected to become the largest source of emissions in the transportation sector by 2030.²

The Government of Canada has identified transitioning the MHDV sector to Zero Emission Vehicles (ZEVs) as a critical pathway to driving down transportation emissions and reaching the new climate target of cutting emissions by 40% below 2005 levels by 2030, and achieving net-zero emissions by 2050. In addition to pursuing a combination of investments and regulations to support Canadians and industry in this transition, Canada's Zero Emission Vehicle Awareness Initiative (ZEVAI) aims to address a current lack of awareness, knowledge, and confidence in ZEVs in order to accelerate widespread adoption.

Among business and fleet operators there is low awareness and confidence in ZEVs, and the majority of whom are small companies that face tight profit margins.³ *Zero-Emission Vehicle Awareness & Education: Towards inclusive and equitable outcomes in the MHDV sector* seeks to uncover how ZEVAI can support diverse and inclusive outcomes, through developing insights on incorporating equity, diversity and inclusion in prospective ZEV awareness and education projects. Specifically, this research brings together insights from literature, industry, and subject matter experts to identify gaps and opportunities for ZEV awareness and education outreach within underrepresented and underserved groups in the MHDV sector. Through a combination of primary and secondary research, this study explores:

¹ Environment and Climate Change Canada, *Discussion paper for heavy-duty vehicles and engines in Canada: transitioning to a zero-emission future* (2021), 5. https://www.canada.ca/content/dam/eccc/documents/pdf/cepa/21199_HDV%20Discussion%20Document_Dec%2016_MinO%20Approved_Final_EN.pdf

² Environment and Climate Change Canada, *Discussion paper for heavy-duty vehicles and engines in Canada: transitioning to a zero-emission future*, 6.

³ Government of Canada, "Zero Emission Vehicle Awareness Initiative." <https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/electric-and-alternative-fuel-infrastructure/zero-emission-vehicle-awareness-initiative/22209>

- a. Baseline levels of knowledge about ZEVs and current ZEV awareness and education programs, within underrepresented groups in the MHDV sector;
- b. Common gaps in knowledge, and existing barriers to accessing ZEV education and awareness programs, specific to underrepresented groups; and
- c. Potential best practice solutions and government interventions to address these identified gaps and barriers, including specific opportunities to effectively engage these underrepresented groups with new ZEV awareness and education projects and programs, and government to build capacity and support systems for underrepresented groups in the MHDV sector.

While this report provides important considerations for Canada's ZEVAI, it should be noted this research consulted a small sample of experts and representatives from underserved and underrepresented groups. As such, insights should not be viewed as a conclusive representation of Canada's broad and diverse MHDV sector. Future and ongoing research should be undertaken to understand how ZEV programs can benefit an evolving and diverse industry.

In the following sections of this report, we first provide a sector breakdown, followed by key definitions. We then review existing frameworks for practicing diverse, equitable and inclusive engagement, followed by a review of literature on the specific barriers among underrepresented and underserved groups in the MHDV sector in accessing ZEVs and recommended practices for engagement. Next, this report outlines the interview methodology utilized in this study, followed by a summary of results. We then describe the implications of this research and recommendations to support Canada's ZEVAI and prospective ZEV awareness and education projects.

1.1 Sector breakdown

In Canada, MHDV trucks are defined as vehicles with a gross vehicle weight rating (GVWR) between 8,500-26,000 lb (medium-duty, class 2b-6) and above 26,000 lb (heavy-duty, class 7-8). The sector encompasses a range of activities involved in transporting people, as well as goods from producer or supplier to consumer. When it comes to the movement of goods, there are three main types of trucking activities: for-hire, courier, and private carrier.⁴ For-hire trucking (or owner-operators) involves operators who own and drive their own trucks, contracting their trucking services to

⁴ Transportation Association of Canada, *Understanding Goods Movement in Canada: Trends and Best Practices* (2021), 11. <https://www.tac-atc.ca/sites/default/files/site/doc/publications/2021/ptm-goodsmvmt-e.pdf>

carry goods for other companies. Courier services specialize in the transport of parcels, while private carriers are fleets that are owned and operated by businesses who ship their own goods.

In 2019, the trucking and logistics sector employed 3.6% of Canada’s workforce.⁵ While Canada’s labour force comprises of an increasing number of women, visible minorities and Indigenous peoples, these groups are currently underrepresented in trucking. The transportation industry ranks below most other federally regulated sectors when it comes to diversity. For instance, women account for 48% of Canada’s workforce, yet only 3% of trucker drivers, mechanics, technicians, and cargo workers.⁶ While these groups are underrepresented in the trucking sector as a whole, women and minorities make up a greater proportion of small-fleet owner-operators in North America.⁷ Notably, research indicates that small-fleet owner-operators are typically individuals who are historically underserved.⁸

According to Statistics Canada, women, Indigenous peoples, and visible minorities are also underrepresented as business owners.⁹ Notably, these groups have been shown to be more susceptible to adverse impacts from market disruptions, as evidenced by the disproportionate impacts such groups faced throughout the Covid-19 pandemic. Research indicates that these groups were unable to access adequate support¹⁰ and were more likely to indicate that maintaining sufficient cash flow or managing debt was an obstacle for their business compared to all private sector businesses.¹¹

⁵ TruckingHR Canada, *The Road Ahead: Addressing Canada’s Trucking and Logistics Industry Labour Shortages* (2020), 5. https://truckinghr.com/wp-content/uploads/2020/03/THRC-Labour-Market-Information-Report_English-version.pdf

⁶ TruckingHR Canada, *Diversity & Inclusion: A Roadmap for Canada’s Trucking and Logistics Industry* (2019), 3. <https://truckinghr.com/wp-content/uploads/2019/09/Trucking-HR-Canada-Diversity-and-Inclusion-Framework2.pdf>

⁷ OOIDA, *Industry/Owner-Operator Facts* (Owner-Operator Independent Drivers Association, 2021). <https://www.oida.com/wp-content/uploads/2021/03/Trucking-Facts.pdf>

⁸ Global Sustainable Mobility Partnership, *Policies for a mature, flourishing & equitable charging ecosystem* (2021). https://gsmp.world/wp-content/uploads/2021/11/211101-ZEV-Alliance-Policy-Advice_branded_Final.pdf

⁹ Statistics Canada, “Analysis on business majority-owned by various sub-population groups and visible minorities, first quarter of 2022.” <https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2022005-eng.htm>

¹⁰ Guangying Mo, Wendy Cukier, Akalya Atputharajah, Miki Itano Boase, Henrique Hon, “Differential Impacts during COVID-19 in Canada: A Look at Diverse Individuals and Their Businesses.” *Can Public Policy* (2020). <https://doi.org/10.3138%2Fcpp.2020-072>

¹¹ Statistics Canada, “Analysis on business majority-owned by various sub-population groups and visible minorities, first quarter of 2022.”

As such, the transition to ZEVs within the MHDV sector bears equity considerations given the high cost of the transition and the unique and systemic barriers that underrepresented and underserved groups face within the trucking and logistics sector, as well as business owners in Canada. Structural inequalities can put already vulnerable populations in a more disadvantaged position, highlighting the importance of understanding the gaps and opportunities for ZEV awareness and education outreach among underrepresented groups.

1.2 Definitions

No singular definition for diversity, equity and inclusion exists across disciplines, though for the purpose of this project we use the definitions outlined in Pembina’s *Zero-Emission Vehicle Awareness, Education, and Engagement: Advancing diversity, equity and inclusion* report which explored advancing diverse and inclusive outcomes in ZEVAI projects within the passenger vehicle market.

Diversity: defined as the presence of a wide range of human qualities, attributes, lived experiences and perspectives.¹² “Diversity is more than a set of categories. It extends to the principles of inclusion, the recognition and valuing of difference, and the ability to participate equitably in society.”¹³

Equity: defined as “the quality of being fair, which often requires treatment that is not the same.”¹⁴ An equitable approach requires programs and policy to be developed in an inclusive and fair manner, acting to “correct past harms”¹⁵ and removing “barriers that prevent the participation of any individual or group.” In engagement, equity requires “mutually beneficial opportunities for people to contribute.”¹⁶

¹² University of British Columbia, “Equity & Inclusion Glossary of Terms.”
<https://equity.ubc.ca/resources/equity-inclusion-glossary-of-terms/>

¹³ Merli Tamtik and Melissa Guenter, “Policy Analysis of Equity, Diversity and Inclusion Strategies in Canadian Universities – How Far Have We Come?” *Canadian Journal of Higher Education* Vol. 49, 3 (2019).
<https://www.erudit.org/en/journals/cjhe/1900-v1-n1-cjhe05066/1066634ar.pdf>

¹⁴ Women and Gender Equality in Canada, “GBA+: Equality or Equity?” <https://women-gender-equality.canada.ca/en/gender-based-analysis-plus/microlearning-videos/gbaplus-equality-equity.html>

¹⁵ Forth Mobility, *Equity in Practice: Developing a City Transportation Electrification Roadmap* (2020).
https://forthmobility.org/storage/app/media/Documents/Equity_in_Practice_Report.pdf

¹⁶ Simon Fraser University’s Morris J. Wosk Centre for Dialogue, *Beyond Inclusion: Equity in Public Engagement* (2020).
<https://www.sfu.ca/content/dam/sfu/dialogue/ImagesAndFiles/ProgramsPage/EDI/BeyondInclusion/Beyond%20Inclusion%20-%20Equity%20in%20Public%20Engagement.pdf>

Inclusion: defined as “an active, intentional, and continuous process to address inequities in power and privilege.”¹⁷ Inclusion requires creating an environment where individual needs are recognized, and each person has the opportunity to contribute their ideas and experiences to the fullest. In engagement, inclusion requires the involvement of “people who reflect the demographic, attitudinal and experiential diversity of the communities that may be impacted by a decision.”¹⁸

This study seeks to identify gaps and opportunities for ZEV awareness and education outreach within underrepresented and underserved groups in the MHDV sector. As with defining diversity, equity and inclusion, no singular definition of underrepresented and underserved groups exists. For this research, we draw from several definitions developed across a broad range of institutions.

Underrepresented: defined as an imbalance in the representation of individuals or groups within a given community, such that a population^{19,20} “holds a smaller percentage within a significant subgroup than it holds in the general population.”²¹

Underserved: defined as individuals or groups that traditionally have been denied “full opportunity to participate in aspects of economic, social and civic life.”²² These individuals or groups may have limited or no access to resources or services that are “accessible, acceptable, and affordable.”²³

For the purpose of this study, underrepresented and underserved groups may refer to fleets that are owned and/or operated by women; Indigenous peoples; racialized minorities; rural dwellers; and northern dwellers.

¹⁷ University of British Columbia, “Equity & Inclusion Glossary of Terms.”

¹⁸ Simon Fraser University, *Beyond Inclusion*.

¹⁹ Emory University, “Institutional Equity and Compliance - Common Terms.”

<https://equityandcompliance.emory.edu/resources/self-guided-learning/common-terms.html>

²⁰ University of British Columbia, “Equity & Inclusion Glossary of Terms.”

²¹ Utah Division of Multicultural Affairs, “Building Equity & Inclusion Through the Power of Language.”

<https://multicultural.utah.gov/poweroflanguage/>

²² Federal Register, “Methods and Leading Practices for Advancing Equity and Support for Underserved Communities Through Government” May 5, 2021.

<https://www.federalregister.gov/documents/2021/05/05/2021-09109/methods-and-leading-practices-for-advancing-equity-and-support-for-underserved-communities-through>

²³ Centers for Disease Control and Prevention, “Preferred Terms.”

https://www.cdc.gov/healthcommunication/Preferred_Terms.html

2. Best practices for equitable and inclusive engagement

2.1 Existing frameworks

A broad range of resources have been developed to facilitate diverse, equitable and inclusive community engagement. Pembina Institute's previous report on advancing diversity, equity, and inclusion within ZEV programs for personal mobility reviewed a number of available resources and toolkits, some which offer best practices for community engagement specifically on the topic of personal mobility, while others provide more general insights. Themes across toolkits were distilled and combined with insights from stakeholder interviews to arrive at a proposed framework.

Included in full in Appendix D, the framework for personal mobility outlined ideal ZEVAI project attributes according to each of the following themes:

- Intersectionality
- Accountability
- Budget
- Transportation needs assessment
- Partnerships and stakeholder mapping
- Communication
- Community ownership
- Implementation
- Feedback
- Monitoring and evaluation

This framework provides a strong foundation for engaging in ZEV outreach through a diverse, equitable and inclusive lens and is a relevant guide across diverse audiences. Despite its focus on personal mobility, the framework can serve as a basis for engagement in various industry sectors, as such community-based practices are well established in research and practice. In contrast, principles of engagement within the MHDV sector are not well understood. More research is needed to understand how to adapt and tailor engagement practices for the MHDV sector. While many aspects of ZEV trucking have been explored, research has yet to comprehensively identify gaps and opportunities for outreach among underrepresented and underserved groups within the sector. As such, the above framework is presented as merely a starting point, upon

which emerging literature and interview insights explored in this study will inform a more focused approach which we present in our recommendations.

2.2 Literature review

As mentioned, research on ZEV adoption barriers and best practices for engagement in underrepresented and underserved groups in the MHDV sector is nascent. In this section we review new and emerging literature currently available, first outlining barriers preventing underrepresented and underserved groups from adopting ZEVs as well as accessing information and support. Next, we summarize literature on inclusive and equitable engagement practices.

2.2.1 ZEV adoption barriers among underrepresented and underserved groups

Summary of barriers

- Thin margins and limited access to capital and financing
- Reliance on an underdeveloped used MHZEV market
- Lack of access to a yard to install charging and refuelling infrastructure
- Insufficient time and capacity to research MHZEVs
- Limited translation of information into diverse languages
- Minimal exposure to MHZEV pilots and hands-on experience

The transition to medium- and heavy-duty zero-emission vehicles (MHZEVs) for fleets can be challenging, with general barriers such as high upfront costs, technology and policy uncertainty, limited model availability, and a lack of fueling and charging infrastructure. However, research indicates that small and minority-owned fleets in particular, face greater financial and institutional barriers in transitioning to MHZEVs. Specifically, these fleets tend to experience **minimal staffing, thin margins, and limited access to capital and financing**.²⁴

Because capital tends to be constrained among these fleets, concerns are significant regarding potential downtime for maintenance and charging of MHZEVs, as such issues

²⁴ Nicole Wong, *Taking Charge: Supporting Small Fleets in the Transition to Zero Emission Trucks* (Dream.org, 2022), 29. https://dream.org/wp-content/uploads/2022/08/Dream.Org_SmallFleet_1.pdf

could jeopardize revenue for these businesses.²⁵ In addition, many small and minority-owned fleets tend to buy used vehicles,²⁶ and because MHZEV uptake across the sector is nascent, the **secondary market for MHZEVs is not yet established**. Further, these fleets have expressed concern that purchasing a MHZEV may jeopardize previous investments on conventional trucks that are still being paid off.²⁷

While a lack of fueling and charging infrastructure is a barrier to MHZEV uptake across the sector more broadly, small and minority-owned fleets can face **further challenges in establishing and accessing charging and refueling stations**. Some underrepresented fleets may have less financial capacity to install charging stations and they may also **lack reliable access to a yard where installation can occur**.²⁸ If fleets do have access to a depot or yard, they tend to rent rather than own the property. This can complicate the process of charging station installation, as fleets may need to bring their landlords on board and determine who is responsible for footing the bill.²⁹

Of particular significance, underrepresented fleets tend to lack exposure to information about MHZEVs. In fact, white fleet owners are twice as likely as minority fleet stakeholders to have heard about or explored MHZEV options.³⁰ Small and minority-owned fleets often **lack the time and capacity to research MHZEVs**. They may not have non-driving staff to keep track of developing technologies, read informational emails and search out websites and events to learn about MHZEVs. **BIPOC and immigrant operators may also face language barriers when accessing information**.³¹

Further, where MHZEV pilot projects provide a direct opportunity to gain hands-on experience, **pilots are almost exclusively conducted in partnership with large, well-established fleets or other large stakeholder organizations**.³² Unsurprisingly, small, minority-owned fleets may tend to have surface level knowledge about MHZEVs, and lack deeper knowledge about the technology, costs, and financing opportunities.³³

²⁵ Dream.org, *Taking Charge*, 22-23.

²⁶ International Council on Clean Transportation, *No fleet left behind: Barriers and opportunities for small fleet zero-emission trucking* (2022), 15. <https://theicct.org/publication/small-fleet-ze-trucking-oct22/>

²⁷ Dream.org, *Taking Charge*, 22.

²⁸ Dream.org, *Taking Charge*, 26.

²⁹ Dream.org, *Taking Charge*, 27.

³⁰ Dream.org, *Taking Charge*, 3.

³¹ International Council on Clean Transportation, *No fleet left behind*, 3.

³² International Council on Clean Transportation, *No fleet left behind*, 12.

³³ Dream.org, *Taking Charge*, 3.

On a final note, occupations associated with electrification have an increased need for electrical skills; this requirement can act as a barrier for low-skilled workers from underserved communities and current job training pipelines lack an emphasis on targeting these communities.⁵⁴

2.2.2 Practices for equitable and inclusive engagement

Summary of practices

- Tailoring information based on various contextual factors
- Catering to different levels of knowledge
- Meeting fleets where they are, or naturally gather
- Utilizing diverse media outreach to reach fleets on the road (e.g., radio)
- Leveraging trusted messengers and community-based organizations
- Flexibility in engagement schedules, and building in time for persistent follow-up

Research recognizes the importance of **tailoring outreach and engagement with fleets according to the audience’s particular context**. This can include considering geographic scale, location and establishing an understanding of the unique challenges that fleets may face.⁵⁵ Research on best practices for truck eco-driving programs⁵⁶ highlights the need to also account for fleet characteristics, operations, and the regulatory environment of the intended audience. Where there is a lack of current analysis categorizing and breaking down the Canadian trucking industry, accessible information on these factors would help facilitate this.

Importantly, **fleets should be met directly where they are** (e.g., at the port or on the road).⁵⁷ This can help facilitate a shared understanding of a fleet’s context and also takes into consideration that some fleets may not have the flexibility to take time away from being on the road. Where possible, opportunities should be explored for fleets to experience ZEVs firsthand. Truck shows, test drives, demonstrations and pilots provide

⁵⁴ Sara Chandler, Joel Espino, Jimmy O’Dea, *Delivery Opportunity: How Electric Buses and Trucks Can Create Jobs and Improve Public Health in California* (Union of Concerned Scientists & Greenlining, 2017), 4. <https://www.ucsusa.org/sites/default/files/attach/2016/10/UCS-Electric-Buses-Report.pdf>

⁵⁵ Dream.org, *Taking Charge*, 29.

⁵⁶ Leticia Pineda and Yihao Xie, *Trucking Eco-Driving Programs: Current Status in Latin America and International Best Practices* (International Council on Clean Transportation, 2021), 17. <https://theicct.org/wp-content/uploads/2021/06/eco-driving-latam-EN-apr2021-01.pdf>

⁵⁷ Dream.org, *Taking Charge*, 33

the chance for fleets to establish confidence and build knowledge through hands-on experience.³⁹ Test trails and pilots in particular can help fleet owners consider whether and how a ZEV can meet their operational needs. Alternatively, fleets that are constrained by the capacity to be off the road may also **benefit from outreach and information sharing via radio programs, phone and text.**³⁸

Fleet operators already share a lot of information with each other, and a survey of truckers in Canada and the U.S. indicates that information shared between one another is viewed as being just as trustworthy.³⁸ Awareness and education outreach efforts should **consider leveraging trusted messengers to actively share information with their peers.** Existing organizations such as trucking associations may also be suitable channel of communication. In addition, programs may also seek to directly work with community-based organizations who have established a strong foundation of trust among fleets.³⁹

Regardless of the method used to connect with fleets, **it is critical that information is accessible.** ZEV educational materials should aim to use plain language, avoid technical jargon, and define terms where appropriate. In addition, information should be available in diverse languages, predominantly spoken within a given jurisdiction.³⁹ **Education materials and curriculum should also cater to different levels of knowledge about EVs and associated technologies.**

Finally, additional considerations for outreach and engagement include timing and feedback and evaluation. Due to limited capacity and in some cases, non-traditional schedules, **extensive lead time and persistent follow-up may be needed to establish opportunities for engagement.**⁴⁰ Monitoring and evaluating systems both during engagement and post outreach can provide an opportunity to improve programming offered and ensure that feedback is incorporated.⁴¹

³⁸ International Council on Clean Transportation, *No fleet left behind*, 14.

³⁹ Dream.org, *Taking Charge*, 34.

⁴⁰ Dream.org, *Taking Charge: Supporting Small Fleets in the Transition to Zero Emission Trucks* (2022), 33.

⁴¹ International Council on Clean Transportation, *Trucking Eco-Driving Programs*, 23.

3. Stakeholder interviews

3.1 Methodology

Interviews were conducted to address the broader research questions noted in Section 1 and were completed from November 2022 to January 2023. We identified three stakeholder categories to initiate stakeholder mapping and interview outreach. These groups consisted of:

- Organizations administering fleet electrification programming
- BIPOC- and women-led trucking alliances and companies
- Trucking associations.

Interview questions were developed to elicit feedback relating to four topic areas:

- Knowledge about ZEVs and current awareness and education programs
- Barriers to accessing information and ZEV adoption
- Communication methods for accessible information and support
- Best practices for participation and inclusion.

The interview process and questions were adapted based on the participant being interviewed, along with consideration of their unique experience and expertise. For example, we asked BIPOC- and women-led trucking alliances and companies if there were specific measures that would help them or their members more easily access ZEV information and/or training programs; organizations that administer fleet electrification programs were asked for experience-based recommendations to better reach underrepresented and underserved groups in the sector. A full set of the questions used can be found in Appendix E.

To analyze feedback from interview participants, interview recordings were transcribed and synthesized into key thematic areas. In the following section, we describe interview results and then highlight implications and recommendations of this research.

3.2 Interview results

Of 40 invitations, a total of 20 interviews were administered throughout the study period. Table 1 below breaks down the sample of interview participants into stakeholder groups.

Table 1. Interview participants by stakeholder group

Stakeholder group	Number
Trucking associations and fleets	6
Experts administering fleet electrification programs	14

Experience in engaging with underrepresented and underserved groups in the MHDV sector ranged considerably across interview participants. Overall, the majority of participants cited having little to no direct experience engaging with underrepresented and underserved fleets, and thus provided insights based on their general observations and understanding of the sector. Notably, experts interviewed within organizations administering various fleet electrification programs in the United States had more experience with engaging underrepresented and underserved groups, compared to Canadian-based organizations.

In addition, difficulty was experienced in directly contacting fleets, which is indicative of the challenge that ZEV awareness and education programs face in reaching this stakeholder group. To overcome low response rates with fleets contacted via email, we directly contacted a small sample of fleets via telephone. As noted below, further efforts should be placed on reaching fleets using non-traditional outreach methods (e.g., social media).

Interview data is summarized below into key thematic areas that address the research questions posed in Section 1. Additional findings related to barriers to ZEV adoption are included in Appendix B.

3.2.1 Baseline levels of knowledge about ZEVs and current awareness and education programs

Summary of baseline levels of knowledge

- Aware of MHZEVs but lack in-depth understanding of vehicles and infrastructure
- Familiarity with ZEV information, training and adoption support programs is low
- MHZEVs can be viewed as unattainable due to high costs and limited infrastructure
- Tendency for knowledge to be based on information circulating among operators and peers

Baseline levels of knowledge and familiarity with ZEVs

Across the MHDV sector as a whole, ZEV knowledge levels can range considerably. Broadly, there are fleets who are very knowledgeable about ZEVs and those who know very little. Among small and minority-owned fleet operators, interviewees indicated that these fleets tend to be aware of ZEVs and that the technology exists, yet have **only a basic understanding of the vehicles and infrastructure needed to support them**. Due to a lack of capacity in many cases to undertake dedicated research on ZEVs, **current levels of knowledge tend to be based on information circulating among operators**.

Interviewees shared that in some cases these **vehicles are viewed as unattainable due to a lack of infrastructure, and these vehicles having a price point that is unaffordable**. Interestingly, one interviewee shared that ZEVs can sometimes be associated with autonomous vehicle technology, which has the potential to be viewed as a future threat among independent owner-operators.

Among women-led trucking companies, it was noted that current operations are dominated by diesel vehicles and that familiarity with ZEVs is low. Further, **without infrastructure in place, many perceive these vehicles as an option that is currently unrealistic**. It was also noted by one interviewee that Indigenous communities tend to be less informed about ZEVs than non-Indigenous transit agencies or companies.

Baseline levels of knowledge and familiarity with ZEV programs

It was notable across interviews that **familiarity with ZEV programs that provide information, training and adoption support is low** among underrepresented and underserved groups in the sector. Interviewees expressed that awareness, particularly regarding vehicle incentives and other support programs, is minimal.

3.2.2 Common gaps in knowledge, and existing barriers to accessing ZEV education and awareness programs

Common gaps in knowledge about ZEVs

Summary of common gaps in knowledge

- High degree of technology uncertainty
- Concerns related to range anxiety and weight limitations of MHZEVs

- Knowledge about charging infrastructure and requirements is limited
- Limited understanding of the need for early planning with utilities
- Uncertainty about what questions to ask to plan for MHZEVs

Interviewees noted that there are gaps in knowledge about ZEVs across the sector as a whole. Unless individuals have had an opportunity to get close to a ZEV and experience it, there is bound to be an incomplete and comprehensive understanding of the technology. It was also noted that **technology uncertainty is high** across the sector more broadly, which stems from a lack of understanding regarding future direction toward battery electric versus hydrogen fuel cell vehicles.

Among underrepresented and underserved fleets, interviewees noted that **fleets are still trying to wrap their heads around vehicle range and there are concerns related to range anxiety**. Additionally, fleets are **unsure about the weight of batteries** and the implications that added weight may have on payload capacity and revenue.

Notably, there are gaps in knowledge about charging infrastructure, including how long vehicles take to charge and what type of charging infrastructure would be needed. It was noted by one participant that **the need for early planning with utilities is a significant information gap**. Interestingly, one interviewee noted due to a perception of the complexity of charging, small- and minority fleet owners expressed the desire to leapfrog battery electric ZEVs until hydrogen vehicles become available. The fueling technology associated with hydrogen vehicles was viewed as much more analogous to fueling for conventional trucks.

When asked about what would be needed for fleets to take the next step in their ZEV transition, larger, more established fleets were said to be much more aware of the information and support that they would require. On the other hand, **among smaller, minority-owned fleets, specific questions and needs were not yet formed** and instead there was a general appetite to simply learn more. Similarly in interviewing a representative from the South Asian trucking community, it was expressed that fleets require a complete package of information, covering the vehicle technology itself, the infrastructure required and the financial supports available.

Existing barriers to accessing ZEV education and awareness programs

Summary of barriers to accessing ZEV programs

- Minimal opportunities to experience MHZEVs firsthand
- Lack of staff who can dedicate time to learn and engage with MHZEV information
- Limited translation of MHZEV information beyond English or French
- MHZEV information tends to be highly technical, and jargon heavy
- Few case studies that incorporate diverse individuals and images
- Tendency to focus on larger, more established fleets to support “big wins”
- Fragmented nature of the sector makes outreach challenging and time-consuming.

Lack of opportunities to experience ZEVs

While noted as a sector wide barrier, one interviewee shared that there are **limited opportunities for fleet owners to see and experience ZEVs firsthand**. Another interviewee indicated that they weren’t sure that many underrepresented and underserved fleets in the sector attended major truck shows, which is a missed opportunity for accessing information, exposure to current support programs and potentially taking part in test drives for ZEVs.

Limited resources and capacity

Several interviewees raised a lack of time, capacity, and resources among underrepresented and underserved groups as a significant barrier to accessing ZEV information, as well as awareness and education programs. For example, small fleets may not have a separate fleet manager as part of their organization who can dedicate time to learn and engage with ZEV information, and support programs.

Other interviewees shared that larger, more established fleets may have a sustainability manager who engages in ZEV outreach opportunities, or they might pay a consultant to research ZEV information and support. However, this isn’t the case for many owner-operators who might operate a single truck, are juggling multiple priorities and thus lack the capacity to seek out information. One interviewee shared that its largely the case that small-fleet operators have **no one within their organization who can spend any type of bandwidth on tracking down ZEV support**. Time spent in workshops, webinars, or researching the latest developments could be time spent on the road, doing another load.

Accessibility of ZEV information

Across several interviews barriers related to the accessibility of ZEV information was raised. These barriers can include the language that ZEV information is currently presented in, and the type of information that is being shared across the sector.

For example, several interviewees noted that **ZEV information and outreach is often presented in languages that are not accessible among underrepresented and underserved groups**. It was noted by one interviewee that they have not come across examples of education programming or outreach material that goes beyond English or French in Canada.

An additional barrier that was noted relates to the complexity of ZEV information currently being shared. A lot of **ZEV content is fairly technical and includes jargon and acronyms**, and there are assumptions that fleet owners are able to understand new and unfamiliar terms (e.g., kWh per mile vs. miles per gallon).

One interviewee also noted that information that is useful for small, owner-operators differs from what larger, more established companies consider when making procurement decisions for a large fleet of vehicles. Information available today tends to not cater to small-fleet owners or operators but instead tends to focus on situations where fleets are assumed to have access to a depot, or have telematics and a green freight strategy. Relatedly, an interviewee shared that there has been **minimal effort to incorporate images and case studies from diverse individuals into ZEV outreach material**.

An additional barrier identified by interviewees includes that a fair number of ZEV studies require payment to access the information or is restricted to certain memberships. Finally, several interviewees noted that the volume of different websites and ZEV programs can be challenging for many fleets to navigate, especially those that are capacity-constrained.

A focus on the big players

Several interviewees noted that there is a **tendency within the industry to focus on larger, more established fleets in the provision of ZEV information**, support, and engagement, as these bigger players represent an opportunity to have a big impact since they can start moving now to deploy and establish ZEVs at scale. This includes testing deployment among large transport companies to prove out the technical feasibility of the vehicles themselves, but also the financial viability of different financing models.

One interviewee noted that it is much more challenging to reach out to 1000 different small independent operators who own a handful of trucks compared to one large fleet with upwards of 3000 trucks, and in this approach, they can focus on the “big wins.” Another interviewee noted that focusing on the large mainstream players can have a big GHG impact, with hundreds of fleet vehicles switched to ZEVs. Additionally, those administrating ZEV educational resources have limited resources and capacity to deliver the highly specialized support required for small, specific use cases.

Similarly, where truck dealers can be a source of information about ZEVs and the supports currently available, there is a tendency to lean toward engaging with larger fleets that are further down the process in transitioning. Small, minority-owned and capital-constrained fleets might require more support from a dealer, might not qualify for financing, and may potentially purchase only a handful of trucks.

Fragmented nature of the MHDV sector

One interviewee noted that even identifying underrepresented and underserved groups in the sector can be difficult. It was noted that there is a **huge portion of the MHDV sector that own and operate their own trucks, and that type of structure makes it inherently difficult to reach out and target specific groups**. Underrepresented and underserved communities are often not part of formal, well-established trucking associations or groups.

3.2.3 Potential best practice solutions and government interventions to address identified gaps and barriers

Summary of best practice solutions

- Utilizing diverse media outlets (e.g., radio, social media) to reach a wider audience
- Meeting communities “where they are at” and emphasizing MHZEV trails and demos
- Catering information to the reality of underserved and underrepresented groups
- Emphasizing inclusive MHZEV case studies and storytelling to build trust
- Facilitating a common understanding of underserved fleets through data provision
- Prioritizing methods that align with authentic over performative engagement
- Leveraging relationships with diverse trucking associations and community champions

Diversifying media outlets

For reasons outlined previously, including a lack of capacity and time, a number of interviewees noted that traditional methods of communication and outreach, such as email, webinars and websites, may not be an effective means of getting in touch and engaging with underrepresented and underserved groups in the MHDV sector. Fleets may be skeptical about providing email contact information to government agencies in particular.

As an alternative, it was noted throughout several interviews that **radio may be a potential opportunity for reaching a wider, more diverse audience**, especially in cases where small, independent owner-operators are likely to be on the road most of the time. Specific radio stations including SiriusXM have a trucking channel that is frequently used by members of the MHDV sector; SiriusXM's Women In Trucking radio show highlights a potential opportunity for engaging with women-owned fleets in the sector. It was also suggested that broadcasting in Punjabi is an opportunity to engage with and reach the South Asian trucking community. For example, Parvasi Media Group's broadcasts in Punjabi that serves over 650,000 people of South Asian background within the Greater Toronto Area.⁴²

Other interviewees suggested exploring opportunities for engagement with diverse communities through truck shows, and trucking magazines such as Heavy-Duty Trucking, Fleet Owners Magazine, and Trucking News. Other groups such as Newcom South Asian Media Co. publishes print media for the South Asian trucking community.

An overwhelming number of interviewees also stressed the need to **adopt social media engagement methods to reach diverse members of the sector**. TikTok, Facebook, Twitter and Instagram were identified as prominent sources of information within the trucking sector, and as platforms that connect diverse members of the sector, especially those who may not otherwise be part of traditional trucking associations.

Leveraging existing relationships

Interviewees mentioned that **existing relationships and channels of communication can be utilized to better reach underrepresented and underserved members of the MHDV sector**. For example, several interviewees suggested utilizing diverse trucking associations to connect with and engage underrepresented and underserved groups. In particular, a focus could be placed on leveraging relationships with trucking

⁴² Parvasi Media Group, "Our Services." <https://www.parvasi.com/>

associations that represent women- and/or minority-led fleets (e.g., DESI Trucking Association, Women In Trucking, the Vietnamese Trucking Association etc.).

Utilizing dealers, brokers and retailers can also enhance engagement with underrepresented and underserved fleets in the sector. For example, an interviewee shared that whereas larger, more established fleets tend to engage directly with OEMs, some small fleets may have established long-term business relationships with dealerships. In some cases, there is a lot of trust established in such relationships and dealers may have developed an understanding of a fleet’s operational needs. As such, there is an opportunity to directly engage dealerships in facilitating engagement and outreach regarding ZEVs.

In addition, several interviewees noted the importance of facilitating engagement and outreach through leveraging the relationships established by champions within a given community. Word-of-mouth is a powerful method of information exchange, and it can be extremely compelling to hear from fellow business owners and fleets on their experience with transitioning to a ZEV. As noted by one interviewee, it’s one thing for government staff to come in and say “do”, but **champions and advocates are already established in many communities, and so leveraging them and letting them take leadership is essential**, as the trust is already there.

Finally, one interviewee noted that underrepresented and underserved groups in the sector could be reached more effectively by leveraging partnerships with organizations that register and certify disadvantaged businesses in Canada. Additionally, partnerships with non-profit community-based organizations that work closely with Indigenous communities can be leveraged to provide ZEV support.

Establishing a community presence

A number of interviewees noted the importance of meeting communities within the MHDV sector where they are. **Reaching communities and delivering support where the community interacts**, potentially through participation in community-oriented events, organizing focus groups and/or facilitating demonstration and trial opportunities within specific communities, may better reach underserved and underrepresented members of the sector. One interviewee also noted that having educational material and information regarding ZEV support available at locations that are frequented by fleets, such as truck stops, could reach a wider audience.

A large number of interviewees spoke to the **need to “take the show on the road”** – focusing on bringing ZEVs to communities, allowing fleets to trial and demo them and

gain a tactile experience. Experiencing a ZEV firsthand can be much more powerful than merely discussing ZEVs or seeing pictures of them. Demonstration events can also provide an opportunity for myth busting and gaining an understanding of information gaps within a community based on questions that are asked by fleets.

Relevant and tailored information sharing

It was noted by one interviewee that **educational material shared through awareness and education programs should cater to the reality of specific minority groups**, as well as made relevant to specific fleet use cases and duty cycles. That is, the lived realities of underserved and underrepresented groups will differ, and within these groups there will be different types of fleet operations (e.g., regional vs long-haul) that may require different ZEV solutions. Careful consideration should be placed on ensuring information is tailored both to the target community as well as their fleet operational needs. For example, before discussing charging solutions for ZEVs, it would be important to assess whether fleets within a specific community tend to have access to a private depot and if they are suited for return-to-base operations.

This notion was referenced by another interviewee, stating that those administering awareness and education programs should determine the location of these communities, come with an understanding of the communities' context and history, and utilize a community-based approach to determine their transportation needs and the benefits that ZEVs would provide.

Inclusive case studies and story telling

Many interviewees noted that greater engagement and trust in information about ZEVs can also be established through awareness and educational efforts that present ZEV case studies. In particular, **case studies should reflect stories from similar organizations or fleets that have experienced or adopted ZEVs.**

Peer-to-peer sharing of case studies can amplify trust in the information being shared. For instance, women-led fleets could benefit from having case studies shared by fellow women in the sector who have adopted ZEVs. Getting more spokespeople who represent certain minority groups at conferences and events was noted as a useful avenue for facilitating inclusive story-telling.

As shared by one interviewee, *“when you see people like yourself talking about the technology or showcasing success stories, this adds trust. People want to see themselves reflected in these campaigns and when stories are shared by a fellow trucker in the community, people can relate to the cultural similarities.”*

Data provision to inform community identification

Some clean transportation programs in the United States facilitate reaching underserved and underrepresented groups by requiring project applicants to identify the sociodemographic characteristics of a target community. However, one interviewee noted that we have little data representing the MHDV sector, and that in many instances payment is required to obtain this information from private companies.

Another interviewee noted that diversity, equity and inclusion can become a nebulous concept when there is a lack of a common understanding of how underrepresented and underserved groups are defined in the sector. As such, interviewees expressed that **there is a role for government to play in facilitating a common understanding through identification of underserved and underrepresented groups**. Diversity, equity, and inclusion could be better integrated into ZEV programs within the MHDV sector with accessible data on demographics and socioeconomic indicators.

Leading with respect and avoiding assumptions

Several interviewees noted that awareness and educational programs should avoid messaging or behaviour that might suggest that underrepresented and underserved groups are uninformed. This includes assuming that these fleets are just driving trucks, they are not aware of the broader environmental impacts that stem from the sector or they don't want to move forward in the transition to clean transportation. Instead, these groups should be treated with respect, and engaged in ways that build confidence in the role they play in the economy and shaping of the future trajectory of the sector.

One interviewee raised the need to **avoid performative engagement rather than practicing authentic engagement**. Trust needs to build over time through elongated engagement and clear intention to bring communities to the forefront in the design of ZEV support programs and solutions. As put by the interviewee *"It's about establishing a true partnership."* Similarly, the delivery of programs ought to be a continuous effort, because we are looking at a long-term transition within the sector and thus engagement has to be a long-term investment of time and resources.

Several interviewees shared specific actions that can facilitate leading engagement with respect and demonstrating a commitment to a long-term relationship. These include **practicing listening, soliciting feedback and questions, providing reimbursements for participants' time, and flexible scheduling of activities**. It is also important to consider that underrepresented and underserved groups may be overburdened by

engagement for different reasons, and effort should be placed on demonstrating the value of their time.

3.2.4 Other interventions needed to build capacity, education and awareness to participate in the ZEV transition

Summary of other interventions needed

- Providing opportunities to support workforce and community skills development
- Seeking out opportunities to partner with academic institutions
- Addressing the complexity of application processes for various MHZEV programs
- Coupling incentives with fleet assessments that cover all aspects of MHZEVs
- Testing innovative financing tools that smooth the impact of high upfront costs
- Integrating identifying criteria into funding application to measure inclusion

Supporting workforce and community skills development

Several interviews spoke to the **importance of developing skills relevant to the ZEV transition within underrepresented and underserved communities**. Specifically, one interviewee noted that they are working with several academic institutions as partners in providing opportunities for capacity-building and skills development targeted at women and minorities. Efforts are being placed to establish such opportunities within communities where ZEV projects, and more specifically hydrogen hubs, are being developed.

Another interviewee shared that efforts have been to develop workforce programs in community colleges throughout California, which provide technical training for fleet technicians. As well, programs are being established in high schools to link skills training through to college and eventually work placements. ZEV-related curriculum is being established in elementary and middle schools with the understanding that students can also become powerful community advocates.

A number of interviewees noted the growing workforce shortage within the trucking and logistics sector. There is an opportunity to not only address the underrepresentation of women and minorities within the sector through targeted workforce training programs, but also to build capacity by coupling such efforts with skills developed specific to ZEVs.

One interviewee noted a recent amendment making truck drivers eligible for express entry for permanent residency to Canada, suggesting that there may be an opportunity

to integrate ZEV skills development and training within truck driver training courses that new immigrants will need to complete before entering the sector.

Adapting ZEV incentives and supports

Interview participants brought up ZEV incentives, noting that funding program could better support underrepresented and underserved fleets in the sector.

The need to **integrate different identifying criteria into funding programs** was raised by one interviewee, as such criteria provide a way to measure the extent to which programs are reaching underrepresented and underserved groups in the sector. Best practices for applying various identifying criteria to determine overburdened and disadvantaged communities can be drawn from California Environmental Protection Agency's CalEnviroScreen tool. In cases where funding applicants don't meet criteria for identifying as an underrepresented or underserved group, applications also include questions regarding the extent to which applicants have engaged in a community and ways in which they anticipate generating skills development opportunities.

One interviewee noted the **need to develop and test innovative financing models to support ZEV uptake across the sector**. Smaller, less well-capitalized fleets are limited in their ability to foot the bill upfront, even if the capital cost of a ZEV reaches the point of total cost of ownership parity with conventional trucks. To address this, aligned capital is required at a magnitude that exceeds what the public sector can realistically cover, meaning approaches are needed to tap into private capital and to explore options to allocate capital costs over a fleet's operating period. Options that require further investigation include electrification-as-a-service (EaaS) models.

In recognition of the limited capacity that some underrepresented and underserved fleets may face, several participants shared **that adjustments are needed to address the complexity of current incentive programs**. In particular, the extensive grant application for Canada's Zero Emission Infrastructure Program (ZEVIP) needs to be simplified to lower barriers for capacity-constrained fleets.

Finally, it was shared by another interviewee that there is a need to **couple current ZEV purchase incentives and funding for infrastructure with financial support for dedicated fleet assessments**. These assessments should be comprehensive, covering all major aspects of transitioning a fleet to ZEVs.

4. Conclusions and recommendations

The transition to ZEVs within the MHDV sector is relatively nascent within Canada, and globally. As such, ZEV engagement best practices within the sector are only beginning to emerge. As the sector continues to evolve in an effort to reach ZEV sales targets and broader climate goals, dedicated efforts to support underrepresented and/or underserved groups within the sector will be critical in overcoming significant barriers and ensuring no fleets are left behind in the transition.

This report explores how ZEVAI can support diverse and inclusive outcomes, through developing insights on incorporating equity, diversity and inclusion in prospective ZEV awareness and education projects within the MHDV sector. Through bringing together insights from literature, industry and subject matter experts, gaps and opportunities for reaching underrepresented and underserved groups were identified and a DEI framework was developed to guide prospective ZEVAI projects.

Depending on project scope and size, adaptation of DEI-related engagement practices into ZEV awareness and education work will vary. Integrating our DEI framework and recommendations should not impose undue hardship on prospective ZEVAI projects. Rather, applicants should consider the framework as a guide and determine aspects of it that can best be supported to facilitate equitable and inclusive outcomes. Critically, prospective projects should build the costs of the following DEI-practices into their budget at the project planning stage to ensure such actions can be fully supported. Lastly, ongoing research should be supported to adapt the proposed DEI framework as the sector continues to evolve.

Section 4.1 below presents key recommendations for NRCan and prospective ZEVAI projects, followed by our DEI framework in Section 4.2.

4.1 Recommendations

The following recommendations should be considered within reason, to facilitate equitable and inclusive outcomes from ZEVAI.

ZEVAI Projects

1. Indicate if the project will directly serve a community classified as being underrepresented and/or underserved within the sector, or how a project focused on the public at large will inform and consider such groups within the sector.
2. Demonstrate that the project team has a clear understanding of the target community's context, history, and intersectionalities, including how this might impact and shape the engagement approach and scope of educational and awareness-based information.
3. Use engagement and outreach strategies that incorporate a range of media outlets, inclusive images and case studies and translation into diverse languages.
4. Create opportunities to meet communities where they are at, and where possible provide firsthand MHZEV experiences.
5. Nurture genuine partnerships with community-based organizations, local champions, diverse trucking associations, dealers, and/or others to extend engagement with underrepresented and/or underserved groups in the sector.
6. Practice authentic engagement over performative engagement by setting and communicating clear goals and expectations, avoiding biases, integrating flexibility into project design, and facilitating open feedback channels.
7. Provide reimbursements to remove financial barriers to participation.
8. Develop, measure and report on DEI-related key performance indicators.
9. To the extent possible, seek out ways to couple project goals with supporting benefits to the wider community.

NRCAn

1. Continue to support ongoing research for the development of DEI related practices that can support equitable and inclusive outcomes within ZEVAI.
2. Consider how ZEVAI projects are adequately funded to incorporate DEI elements into engagement and outreach practices.
3. Move toward facilitating a common understanding of underrepresented and underserved groups within the MHDV sector through the collection and provision of data.
4. Explore other opportunities to integrate DEI elements into ZEV related programs and supports within the MHDV sector, drawing from emerging practices summarized in Appendix A, Table 3.

4.2 Proposed DEI framework

The proposed framework combines insights from literature summarized in Section 2, and interview insights outlined in Section 3.

Table 2. Proposed DEI framework

Theme	Ideal Project Attributes	Alignment with DEI
Community identification	<ul style="list-style-type: none"> • The project has clearly identified how its target audience falls within the category of being ‘underserved and/or underrepresented’ based on key identifying factors. That is, the project considers how the target audience fits within the broader sector according (but not limited) to: <ul style="list-style-type: none"> • Socioeconomic status • Gender • Ethnicity • Race • Geographic location • In cases where projects do not plan to directly engage with underrepresented and/or underserved groups, there is clear identification of how the project will inform and consider such groups within the sector (e.g., knowledge transfer). • See Appendix A. regarding methods used to identify disadvantaged and overburdened communities in California to inform best practices. 	Diversity
Informed approach	<ul style="list-style-type: none"> • The project demonstrates a clear understanding of the target community’s context, history, and intersectionalities, preferably informed by how community members themselves define and experience their communities. • If the project seeks to engage the public at large, there is acknowledgement of diversity in such factors as context, history and intersectionalities. 	Diversity
Aligning project benefits	<ul style="list-style-type: none"> • The project benefits should have been identified in collaboration with the target community. • The key benefits of the project have then been reiterated to the target community, and the relationship between project benefits and existing community goals (expressed formally or informally) are identified. Key benefits to consider can include (but are not limited to): <ul style="list-style-type: none"> • Skills training and workforce development • Network building • Air pollution reductions 	Equity

	<ul style="list-style-type: none"> • Enhanced access to financial and non-financial supports • Provision of tools and resources. 	
Communication methods	<ul style="list-style-type: none"> • Target communities have been engaged and consulted on preferred and optimal communications methods. • The project, based on target community engagement, has considered a range of media outlets (e.g., social media, magazines etc.) and seeks to prioritize communication methods that go beyond traditional forms of outreach (i.e., email) in order to reach a diverse audience. • Outreach and communication are delivered in languages that are diverse and/or reflect the target community. • Opportunities to meet communities where they are at or naturally gather (e.g., community-based events, truck stops etc.) are considered to reduce barriers to participation. 	Diversity Inclusion
Information accessibility	<ul style="list-style-type: none"> • The project demonstrates that educational and awareness-based information will be made relevant, and tailored to the context of the target community, with deliberate consideration of unique challenges, geographic scale, and other contextual factors. If the project seeks to engage the public at large, efforts are taken to incorporate information applicable to diverse sets of community contexts. • The project will deliver material in a manner that: <ul style="list-style-type: none"> • Avoids technical jargon and acronyms; • Caters to different levels of familiarity and knowledge; and • Prioritizes plain, simple language. • Where possible, the project translates educational material into diverse languages and/or a language that best suits the target community. • Materials are created with inclusive, and culturally resonant images, case studies, stories, and references. • The project explores opportunities for providing community members with firsthand experience (e.g., MHZEV test trials, demonstrations). 	Inclusion
Stakeholder mapping	<ul style="list-style-type: none"> • The project has outlined a list of key stakeholders through which partnerships can be established to better reach and engage with diverse groups within the sector. These may include, but are not limited to: <ul style="list-style-type: none"> • BIPOC- and women-focused trucking associations • Community champions • Community-based organizations • Small, minority, women, and/or veteran-owned business certification organizations • MHDV dealerships • The project demonstrates the extent to which prospective partners have engaged with and hold pre-existing relationships with community members. 	Diversity Inclusion

	<ul style="list-style-type: none"> • There is clear identification and communication of the role of partners throughout the project. 	
<p>Equitable and inclusive implementation</p>	<ul style="list-style-type: none"> • The level of participation (i.e., informing, consulting, collaborating or empowering) of the target community (or public at large) is identified and clearly communicated. • The project integrates methods that align with authentic engagement practices versus performative engagement, including (but not limited to): <ul style="list-style-type: none"> • Setting clear intentions to bring community members to the forefront of program design • Communicating the added value of community members contributions to the project, including transparency in how their involvement will shape outcomes • Pursuing project timelines that allow for elongated and consistent engagement • Practicing active listening throughout project implementation • Facilitating open channels for continuous feedback and space for asking questions • Avoiding biases. such as assuming a lack of knowledge or motivation • Reimbursements are provided to community members that reflect expenses associated with participation: <ul style="list-style-type: none"> • Forgone wages • Childcare • Accommodation • Travel • The project builds in flexibility in timing and format of engagement periods to accommodate for diverse schedules (e.g., avoiding meeting times when fleets are likely to be on the road). 	<p>Inclusion Equity</p>
<p>Monitoring and evaluation</p>	<ul style="list-style-type: none"> • The project demonstrates a system for integrating feedback into program design, delivery, material etc. based on engagement with community members. • Key performance indicators are developed to measure and report on DEI indicators (e.g., attendance among small and minority-owned fleets at community-based events). • Resources are established to allow for persistent follow up where needed, to ensure feedback and support is provided. 	<p>Inclusion Equity</p>
<p>Investing in broader impacts</p>	<ul style="list-style-type: none"> • To the extent possible, wider implications of the MHZEV transition on underrepresented and underserved fleets are considered and opportunities are explored to extend project benefits to the wider community (e.g., coupling infrastructure for fleets with support for economic development in a community more broadly). • The project considers how project outcomes and findings will be broadly disseminated to extend knowledge sharing across communities and the sector. • If not the focus of the project, opportunities to build capacity within the target community are explored (e.g., establishing networks, or committees). 	<p>Equity</p>

Appendix A. Jurisdictional review of DEI related MHDV programs

Table 3. Examples of ZEV MHDV programs with DEI criteria

Jurisdiction	Program	Description
California	SB-372 Medium- and Heavy-Duty Fleet Purchasing Assistance Program: Zero-Emission Vehicles	SB-372 establishes a purchasing assistance program to make financing tools and nonfinancial supports available to operators of medium- and heavy-duty vehicle fleets. The bill requires that a minimum of 75% of financing products offered under the program are directed towards operators of medium- and heavy-duty fleets who operate in an underserved community.
California	EnergIIIZE Commercial Vehicles	Funded by California Energy Commission and implemented by CALSTART, EnergIIIZE is a commercial fleet infrastructure incentive project. EV Jump Start is one of four funding streams with a distinct focus on supporting underrepresented and underserved communities. Commercial fleet users eligible for funding of up to \$750,000 per infrastructure project must be either a small business, certified minority business, a school district in a disadvantaged community, a low-income community, tribal entity, and/or a transit agency located in or have at least 50% of fleet operations in a disadvantaged community.
California	HVIP Innovative Small e-Fleet (ISEF) Pilot	Under the ISEF pilot, privately-owned or non-profit trucking fleets with 20 or fewer trucks and an annual revenue of less than US\$15 million can access flexible financing options, lease, rental and truck-as-a service options with enhanced incentives and fueling support. The goal of the ISEF pilot is to reserve US\$25 million within HVIP to implement solutions to assist small fleets in making the transition to zero-emission medium and heavy-duty vehicles.
California	Transforming Trucks Transforming Communities	Transforming Trucks is supported by California Climate Investments and managed by CALSTART. The program offers a one-stop-shop for information and resources about transitioning fleets to zero emissions, tailored specifically to small businesses and fleets. Resources are also available for

		communities, including support for reporting illegal idling in neighborhoods and operation of trucks without pollution control filters.
California	California Capital Access Program (CalCAP)	The CalCAP Heavy-Duty Vehicle Air Quality Loan Program administered by California Air Resources Board (CARB) is a loan loss reserve program which can provide up to 100% coverage on losses from certain loan defaults. A financial institution receives support when it underwrites small business loans for air quality compliant vehicles to small-fleet owners. Small fleet owners can receive more favorable loan terms from participating.
California	SB-350 Clean Energy and Pollution Reduction Act of 2015	<p>Among other things, SB 350 requires California Public Utilities Commission, in consultation with California Energy Commission and California Air Resources Board to direct utilities to undertake transportation electrification activities. Several projects have been supported under this initiative including PG&E's FleetReady Program which includes an investment of US\$236 million to support make-ready charging installations to support at least 6,500 medium- and heavy-duty fleet vehicles. A minimum of 25% of the project budget must be spent in disadvantaged communities. The program also offers rebates of up to 50% of the cost of EVSE for sites in disadvantaged communities.</p> <p>Disadvantaged communities are defined as areas which suffer from a combination of economic, health and environmental burdens (e.g., poverty, high unemployment, air and water pollution, presence of hazardous waste and high incidences of asthma and heart disease). These communities are identified by collecting and analyzing information from communities across the state of California. The CalEnviroScreen, is an analytical tool that combines different types of census tract-specific information into a score that reflects which communities are most burdened or "disadvantaged."</p>
California	The Clean Transportation Training Project	California Energy Commission will support training of technicians to repair and maintain alternative fuel vehicles through funding the Advanced Transportation and Logistics Sector of the California Community Colleges. The project will support EV curriculum and enhancements to community college alternative fuel and vehicle technical training programs in disadvantaged communities. The first training webinar covers technician training for electric school buses.
California	The Inclusive, Diverse, Equitable, Accessible and Local (IDEAL) ZEV Workforce Pilot	The California Energy Commission and the California Air Resources Board provide grant funding for projects that will provide workforce training and development that supports zero-emission vehicles, infrastructure and related commercial technologies. Among other key goals of the investment, a focus is put on making training specifically available to priority communities, and preparing dislocated, unemployed, and new workforce entrants for ZEV careers.

California	CALeVIP	The California Electric Vehicle Infrastructure Project (CALeVIP) provides funding for the installation of publicly accessible EV charging stations across California. CALeVIP 2.0 provided funding to the nonprofit Center for Sustainable Energy to accelerate EV charging deployment with a focus on directing 50% of funding for installation in low-income and disadvantaged communities – to focus on equity.
New Jersey	Zero-Emission Incentive Program: Voucher Pilot for Medium Duty and Heavy Vehicles	The New Jersey Economic Development Authority launched a US\$90 million voucher pilot for medium- and heavy-duty zero-emission vehicles. Of the funding available, US\$10 million is set aside for small businesses, and a 25% bonus for small businesses is offered along with a US\$4,000 stackable bonus per vehicle per certified qualifying criteria (e.g., a female minority veteran would qualify for \$12,000 bonus per vehicle purchased).
Massachusetts	MOR-EV Truck Program	The MOR-EV program offers rebates for public and private purchases or leasing of qualified new commercial vehicles. An additional 10% may be added to the currently available value for vehicles above 14,000 pounds GVWR if the vehicle is registered in or will operate more than 50% of the time within census blocks that meet the State's Environmental Justice Income Criteria.
New York	New York Clean Transportation Prizes	The program seeks to electrify transportation, reduce air pollution and enhance clean mobility in underserved communities in New York State. Of the three prize areas, the Electric Truck & Bus Challenge awards projects that demonstrate electrified solutions to deploying medium- and heavy-duty vehicles. Projects should support cost reduction, improved EV infrastructure, and address systemic challenges to expanded electric fleet adoption.
USA	Discretionary Grant Program for Charging and Fueling Infrastructure	Under the Bipartisan Infrastructure Law, a new funding stream offers a grant program to deploy charging infrastructure and alternative fueling infrastructure along designated fuel corridors. At least 50% of the funding must be used for a community grant program where priority is given to projects that expand access to infrastructure within rural areas, low- and moderate-income neighbourhoods and communities with a low ratio of private parking spaces.

Table 4. Examples of ZEV strategies with considerations for DEI in the MHDV sector

Organization	Strategy	Description
Equity Workgroup (EWG)	Electric Vehicle Charging in Communities	Among other things, this strategy report describes how the definition of equity intersects with medium- and heavy-duty vehicle charging. Strategies to promote equitable deployment of charging infrastructure for medium- and heavy-duty vehicles includes incorporating the perspective of frontline workers and fence-line communities and using GIS tools and community consultation to identify charging site selection. To extend the impact of investments to those with the fewest resources and/or facing barriers to participation in the ZEV transition, government funded incentive projects can ensure that small businesses, particularly those owned by women and people of colour are included either as recipients of funding and/or installation of infrastructure. Key metrics include measuring the share of incentives claimed by small, minority-owned, and women-owned business enterprises and vendors. It is recommended that a formal benchmark sets a minimum share of projects sited at or made accessible to small, minority-owned and women-owned business enterprises.
ZEV Task Force	Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan	A series of recommendations are provided to support a just and equitable transition to zero-emission trucks and buses. Notably, the action plan indicates that as governments accelerate zero-emission medium- and heavy-duty vehicle adoption and infrastructure deployment, that there is an opportunity to develop policies and leverage investments to ensure just and equitable outcomes for workers. To create equitable access to emerging jobs, a focus should be placed on developing workforce training and retraining programs for workers in overburdened, underserved, and low-income communities. It is recommended that governments partner with overburdened and underserved community leaders and members to understand barriers that prevent community access to job training programs and opportunities.
California Air Resources Board	Long-Term Heavy-Duty Investment Strategy	This investment strategy provides a roadmap for incentives in transforming the heavy-duty vehicle sector, and among other goals, commitments seek to promote equity by ensuring that investments benefit communities most impacted by poor air quality and provide assistance to small fleets and owner-operators. The strategy notes that as regulatory requirements approach, the incentive strategy will shift toward focusing on providing financial assistance for smaller fleets that face challenges in qualifying for traditional financing programs. Going forward an equity overlay will be applied to all investments that look at ways to target funding to small fleets, priority populations and underserved communities.

Appendix B. Additional findings regarding barriers to adoption

Summary of barriers

- Lack of a used MHZEV market and uncertainty about behaviour of secondary market
- Uncertainty about MHZEV suitability in northern regions and in harsh climates
- Limited access to clean electricity and network connection in some remote areas
- High upfront costs of MHZEVs and limited flexibility to take on risk
- Tendency to lease property, requiring landowners to permit infrastructure installation

ZEV availability and suitability

Interviewees frequently noted that limited ZEV availability and suitability are barriers to uptake across the MHDV sector more broadly. For instance, there is currently a lack of ZEV models on the market that are suitable for long-haul operations. This significantly narrows the number of fleets that can consider a ZEV to primarily those who operate regionally, and have return-to-base operations.

However, vehicle availability and suitability factors can present more significant barriers for some underrepresented and underserved groups in the sector. Notably, several interviewees noted that a lack of an established used ZEV market is a significant challenge for small, minority-owned and capital-constrained fleets. Key uncertainties include how long it will take for a used ZEV market to become established as overall adoption rates in Canada are low, and whether the ZEV market will behave differently in terms of the duration of ZEV ownership in the primary market.

Issues surrounding vehicle suitability are also more pronounced for rural, remote and Indigenous communities. One interviewee noted that the further north a community is situated, the more prominent considerations in operating a ZEV in harsh weather and temperature conditions (e.g., reduced range) become.

Access to clean electricity and network connection

Interviewees shared other unique barriers that rural, remote and Indigenous communities face which can present a challenge to transitioning MHDV fleets to ZEVs.

For rural and remote communities not connected to the North American electricity grid, diesel and fossil fuels are used to generate electricity. In such cases, GHG reductions that come from running a ZEV are marginal compared to operating a conventional MHDV. Further, electricity prices in many northern and remote communities are significantly higher than the Canadian average, meaning any fuel savings that might otherwise be realized from switching to a ZEV from a diesel truck are largely non-existent. As such, the total cost of ownership for a MHZEV is far less favourable than a conventional truck in such regions.

Another consideration is that a network connection is required for the installation of EV chargers; however, some rural and remote communities lack ethernet, wireless, cellular or a mixed-mode connection. In such cases, it is not viable to operate a ZEV fleet without sufficient charging infrastructure.

High upfront costs

The high upfront costs of acquiring a ZEV, along with the charging and refueling infrastructure required to support the vehicle, present a challenge to many fleets in the MHDV sector. However, such costs present a larger and more insurmountable barrier for many small, minority-owned and capital-constrained fleets.

One interviewee shared that larger, more established fleets have greater flexibility to take on the risk of investing in ZEVs, whereas many underrepresented and underserved fleets are risk constrained. That is, if a small fleet seeks to switch out one of its trucks for a ZEV, that one truck could represent 20% of their fleet and they simply can't afford to risk disruptions to their operations that may arise from transitioning to a new technology, nor the potential implications that such disruptions could have on their profitability.

Access to charging and refueling infrastructure

A lack of charging and refueling infrastructure, along with the length of time it takes to charge a MHZEV are significant challenges that present a barrier to transitioning fleets to ZEVs across the sector broadly. Small and minority-owned fleets may be leasing property and landowners would be required to sign off on permitting and construction of charging and refueling infrastructure.

One interviewee noted that it is extremely challenging for fleets, especially small, capital-constrained independent owner-operators, to justify charging a truck for a significant amount of time when their livelihoods depend on getting product from point A to point B.

While noted previously, a lack of clean, and affordable electricity and network connection present unique challenges for northern, rural, remote, and Indigenous communities when it comes to accessing and installing charging infrastructure.

Appendix C. Summary of literature review and interview findings

Topic	Findings
Literature review	
ZEV adoption barriers among underrepresented and underserved groups	<ul style="list-style-type: none"> • Thin margins and limited access to capital and financing. • Reliance on an underdeveloped used MHZEV market. • Lack of access to a yard to install charging and refuelling infrastructure. • Insufficient time and capacity to research MHZEVs. • Limited translation of information into diverse languages. • Minimal exposure to MHZEV pilots and hands-on experience.
Practices for equitable and inclusive engagement	<ul style="list-style-type: none"> • Tailoring information based on various contextual factors. • Catering to different levels of knowledge about ZEVs. • Meeting fleets where they are, or naturally gather. • Utilizing diverse media outreach to reach fleets on the road (e.g., radio). • Leveraging trusted messengers and community-based organizations. • Flexibility in engagement schedules and building in time for persistent follow-up.
Interviews	
Baseline levels of knowledge about ZEVs	<ul style="list-style-type: none"> • Aware of MHZEVs but lack in-depth understanding of the vehicles and infrastructure. • MHZEVs can be viewed as unattainable due to high costs and limited infrastructure. • Tendency for knowledge to be based on information circulating among operators and peers.
Baseline levels of knowledge about ZEV education and awareness programs	<ul style="list-style-type: none"> • Familiarity with ZEV information and training programs is low. • Awareness of vehicle incentives and other financial support programs is limited.
Common gaps in knowledge	<ul style="list-style-type: none"> • High degree of technology uncertainty.

	<ul style="list-style-type: none"> • Concerns related to range anxiety and weight limitations of MHZEVs. • Knowledge about charging infrastructure and requirements is limited. • Limited understanding of the need for early planning with utilities. • Uncertainty about what questions to ask to plan for MHZEVs.
<p>Existing barriers to accessing ZEV education and awareness programs</p>	<ul style="list-style-type: none"> • Minimal opportunities to experience MHZEVs firsthand. • Lack of staff who can dedicated time to learn and engage with MHZEV information. • Limited translation of MHZEV information into diverse languages. • MHZEV information is highly technical, and jargon heavy. • Few case studies that incorporate diverse individuals and images. • Tendency to focus on larger, more established fleets. • Fragmented nature of the sector makes outreach difficult.
<p>Potential best practice solutions and government interventions to address gaps and barriers</p>	<ul style="list-style-type: none"> • Utilizing diverse media outlets to reach a wider audience. • Meeting communities “where they are at.” • Catering information to the realities of underserved and underrepresented groups. • Emphasizing inclusive MHZEV case studies. • Providing data to facilitate a common understanding of underserved and underrepresented groups. • Practicing performative engagement • Leveraging existing relationships.
<p>Other interventions needed to build capacity, education, and awareness</p>	<ul style="list-style-type: none"> • Providing opportunities to support workforce and community skills development. • Seeking out opportunities to partner with academic institutions. • Address complexity of application processes. • Coupling incentives with comprehensive fleet assessments. • Testing innovative financing tools. • Integrating identifying criteria into funding application to measure inclusion.

Appendix D. Previous DEI framework for personal mobility

Table 5. Proposed DEI framework - ZEV Awareness & Education in Personal Mobility⁴³

Theme	Ideal Project Attributes
Intersectionality	<ul style="list-style-type: none"> Organizers at minimum acknowledge all possible intersectionalities of the community members they plan on engaging: <ul style="list-style-type: none"> Language, gender, socio-economic status, digital inequality, sexuality, (dis)ability, employment status, immigration/citizenship status, education level, geography, religious beliefs, culture, history of incarceration. Organizers outline how the program will be designed to meet the most vulnerable community members “where they are at” and support them to share their lived experiences.
Accountability	<ul style="list-style-type: none"> The project has clarity on which team member(s) is/are accountable for ensuring DEI goals are met. There are clear considerations in place for how community members engaged in the project will have access to timely, accurate and relevant information from project leaders.
Budget	<ul style="list-style-type: none"> A project needs to have substantial financial resourcing to complete the transportation needs assessment phase and secure partnerships with NGOs and/or CBOs. A budget is allocated to compensate community participants for their time, and organizers for their labour. Budget to address barriers that may prevent low-income residents from participating: <ul style="list-style-type: none"> Forgone/lost wages Childcare Food Transportation to and from the engagement location Language translation, either by a formal translator or a local community resident, is budgeted for.
Transportation needs assessment	<ul style="list-style-type: none"> An assessment period is planned, which will identify the unique transportation needs of each community that organizers are planning to engage.

⁴³ This framework is from Pembina Institute’s previous report titled *Zero-Emission Vehicle Awareness, Education, and Engagement: Advancing diversity, equity and inclusion*. This proposed DEI framework reflects DEI best practices for ZEVAI projects advancing awareness and education for personal mobility.

	<ul style="list-style-type: none"> • The assessment includes all possible zero-emission mobility options (e.g., personal vehicles, active transportation, carpooling, public transit, carshare, bikeshare, taxis/ride-hailing, etc.), with recognition of the direct benefits, indirect benefits, negative/unintended impacts, income distributional impacts and intergenerational impacts associated with each. • The needs assessment process uses both qualitative and quantitative analysis methods, through surveys, interviews, working groups, and/or focus groups.
Partnerships/ stakeholder mapping	<ul style="list-style-type: none"> • A list of prospective partners and key stakeholders is outlined in the project plan and includes key CBOs, with an explanation of how each planned CBO partnership will help reach residents in a way that the projects could not otherwise. • A review of decision-makers who could have influence over the community's mobility future is included in the stakeholder map. • There are plans to subcontract a range of the engagement activities to the CBOs who hold pre-existing relationships with community members.
Communication	<ul style="list-style-type: none"> • Communications materials and media are being created with intersectional images, stories, and culturally resonant references for the target communities. • The person-to-person interactions throughout the project, along with communications materials, are completed with translation services necessary for whichever target community the organizers are engaging.
Community ownership	<ul style="list-style-type: none"> • The project identifies whether it will: 1) Inform, 2) Consult, 3) Involve, 4) Collaborate, or 5) Empower/Defer To, community members.⁵⁴ • If the project does not reach stage 5 of the spectrum, the project organizers present a list of key barriers preventing them from doing so and provide possible solutions for how those barriers may be overcome, either by the project itself, or by future projects.
Implementation	<ul style="list-style-type: none"> • For projects with a local scope, organizers commit to engage local decision-makers who have influence over the implementation of the community's recommendations; if this is not possible, demonstrate a recognition of institutional barriers preventing action from taking place. • Identification of the financial and human resources needed to ensure long-term participation of underrepresented community members in helping shape their zero-emission mobility future.
Feedback	<ul style="list-style-type: none"> • Digital and in-person feedback mechanisms are available. • Formal and informal feedback is systematically received, recorded, and responded to.
Monitoring and evaluation	<ul style="list-style-type: none"> • Course corrections and program design adjustments are completed on an ongoing basis, based on community feedback.

Appendix E. Interview questions

Topic	Questions
<p>Knowledge about ZEVs & current awareness and education programs</p>	<ul style="list-style-type: none"> • Based on your experience, how familiar are underrepresented groups with ZEVs? • What are common gaps in knowledge about ZEVs? • Do any specific themes tend to motivate underrepresented groups you engage with to pursue ZEV adoption or other related actions associated with reducing GHGs (e.g., health, safety, cost savings, climate benefits)? • In your experience, are underrepresented groups familiar with ZEV programs that provide information, training, and adoption support? (e.g., iMHZEV, ZEVAI)
<p>Barriers to accessing information and adoption</p>	<ul style="list-style-type: none"> • What are some of the key barriers that underrepresented and hard-to-reach groups face when attempting to access information and/or outreach programming about ZEVs? • What do underrepresented groups you work with commonly identify as key barriers preventing them from adopting ZEVs?
<p>Communication methods for accessible information and support</p>	<ul style="list-style-type: none"> • Based on your experience, what information sources are commonly used among underrepresented groups (e.g., other truckers/fleet operators, radio, media) to learn about new technologies within the sector? Or changes to regulation? • In your opinion, what type of messaging might create greater engagement and trust in the information underrepresented groups receive about ZEVs? • What methods of communication and engagement might make information and support for ZEVs more accessible to these groups?
<p>Best practices for participation and inclusion</p>	<ul style="list-style-type: none"> • In your opinion, what are some of the common barriers preventing programs in reaching underrepresented groups? • What solutions might allow for outreach and education building programs to better reach underrepresented groups in the sector? • What measures have you found effective to incorporate diversity, equity, and inclusion within the program you oversee? • What supports do you feel are needed to help your organization better incorporate diversity, equity and inclusion into the programs that you offer? • In your opinion, what other interventions are needed to build capacity, education, and awareness among underrepresented groups to participate in the ZEV transition?
<p>Other</p>	<ul style="list-style-type: none"> • Is there anything we haven't touched on that you'd like to share? • Are there specific stakeholders that you believe we should be engaging with?

Note: Interview questions presented in the table above were developed for interviews with organizations administering fleet electrification programs. Questions were modified when used with different interview participants.