

Medium and Heavy-Duty Vehicles (MHDV) Fleet Awareness, Knowledge and Attitudes Related to Zero-Emission Vehicles (ZEVs) Survey

Report



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Medium and Heavy-Duty Vehicles (MHDV) Fleet Awareness, Knowledge and Attitudes Related to Zero-Emission Vehicles (ZEVs) Survey

Final Report

Prepared for Natural Resources Canada by Abacus Data

February 2023

Natural Resources Canada (NRCan) commissioned Abacus Data to conduct a public opinion research survey of the Canadian freight transportation industry. The aim of this research was to understand perspectives on zero-emission medium and heavy-duty vehicles in the trucking industry as well as establish a baseline for future measures. A total of 337 representatives of the Canadian freight transportation industry who were involved in or knowledgeable about the vehicle management, use and purchasing of vehicles for their fleet of vehicles were surveyed by telephone in October and November of 2022. This publication reports on the findings of this research.

Cette publication est aussi disponible en français sous le titre: Sondage : connaissances et attitudes des exploitants de parcs de véhicules moyens et lourds (VML) à l'égard des véhicules à émission zéro (VEZ).

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1. Executive Summary

1.1. Research Purpose

Zero-Emission Vehicles (ZEVs), including medium- and heavy-duty vehicles (MHDV), are key to reducing transportation emissions in Canada. The purpose of the research is to provide a baseline understanding of how fleet owners and managers view ZEVs. It is important to have a reliable baseline within the context of such a dynamic industry in order to provide information now, and over time, that can be used to inform government policy and program design. The survey measures awareness, knowledge and confidence in ZEVs.

1.2. Research Objectives

The overall objectives of the research are to:

- Provide insight into Canadian MHDV fleet awareness, understanding, attitudes and confidence regarding ZEVs.
- Provide a baseline for key performance indicators and key market data to measure and track impacts and progress resulting from government and partner investments to foster ZEV adoption in the freight sector.

In addition, the findings will be used to advance policy and program investments to achieve the government's ZEV objectives.

1.3. Methodology

A total of 337 telephone surveys were completed with commercial, institutional and government fleet owners and operators between October 14 and November 16, 2022. The margin of error for a sample of this size is +/- 5.3. Data is weighted by NAICS code.

To qualify, respondents need to be at least knowledgeable about their company's fleet in regard to vehicle management, use and purchasing of vehicles.

1.4. Sub-group analyses, statistical significance and rounding

In addition to descriptive analysis, analysis was undertaken to establish any differences in views based on business characteristics such as location (region), type of fleet (private, for-hire and both), and number of trucks. Only differences significant at the 95% confidence level are discussed in this report. The margin of error for sub-groups varies by population size. For example, a sub-group of 90 respondents would have a margin of error of +/-10.3 while one of only 50 respondents would be +/- 13.9.

Please note that due to rounding, in some cases it may appear that merged categories collapsed together are different by a percentage point from when they are presented individually, and totals may not add up to 100%.

1.5. Contract value

The total contract value for the project was **\$81,699.00** including applicable taxes.

1.6. Statement of Political Neutrality

I hereby certify as a representative of Abacus Data that the deliverables fully comply with the Government of Canada political neutrality requirements outlined in the Communications Policy of the Government of Canada and Procedures for Planning and Contracting Public Opinion Research. Specifically, the deliverables do not include information on electoral voting intentions, political party preferences, standings with the electorate or ratings of the performance of a political party or its leaders.

A handwritten signature in black ink, appearing to read 'Richard Jenkins', is written over a horizontal line.

Richard Jenkins, Ph.D., CAIP

1.7. Summary of Findings

1.7.1 Key Highlights

- Only 5% of fleet operators currently have ZEVs in their fleet. The percent of fleets currently with ZEVs doesn't vary substantially based on fleet size.
- Most fleets (67%) that have ZEVs added them in the past 2 years.
- Among those who do not have a zero-emission vehicle in their fleet, only 16% say that their staff have ever driven a ZEV .
- About 35% of fleets are considering ZEVs while another 7% either already have or fully intend to purchase a ZEV.
- 13% of companies in largest fleet category say they fully intend to purchase or lease additional zero-emission vehicles.
- 65% of companies say it is difficult to find credible sources of information about ZEVs.
- Forty-three per cent (43%) agree the company would save money with ZEVs.
- About 89% of respondents agree that battery-electric vehicles cannot travel far enough on a full charge.
- 16% would be willing to pay more for a ZEV than an equivalent gas or diesel vehicle.

1.7.1. Highlights

Three-hundred and thirty-seven representatives from the Canadian freight transportation industry were interviewed by telephone in the fall of 2022. One quarter of the fleets interviewed (33% once weighted to the population) have fewer than 5 trucks, while 9% have more than 50 trucks in their fleet. The key findings which are representative of the industry as a whole from the survey are detailed below.

Vehicle Purchase Intentions and Drivers

Proactive replacement of fleet vehicles for fuel efficiency is important but clearly a secondary driver of new vehicle purchases or leases behind vehicle replacement and company business growth. Almost half of fleets are motivated by efforts to decrease their company's greenhouse gas emissions when deciding whether or not to purchase a new vehicle.

Once a decision is made to add a new vehicle, fleet operators primarily consider operational considerations when deciding what vehicle your company will purchase. These operational considerations include:

- Maintenance requirements (96% very/somewhat important).
- Fuel efficiency (94%).
- Purchase or financing cost (92%).
- Being the right fit for their duty cycles (88%).

The environmental impact of the vehicle (72% very/somewhat important) is a secondary consideration when making a vehicle choice. A lower consideration for most companies is choosing the same vehicle that already makes up their fleet (64%).

Zero-emission Vehicle (ZEV) Impressions and Experience

The most (34%) mentioned spontaneous impressions of zero-emission vehicles are references to perceived challenges related to inefficiency, weather considerations, and charging issues.

Familiarity with various aspects of how zero-emission vehicles perform is relatively modest. A quarter (25%) or less feel they are very familiar, but about half or more are familiar with the following key attributes:

- How the "fueling up" process works when electricity powers a vehicle instead of gas or diesel (59% very or somewhat familiar).
- Operational performance of zero-emission vehicles, such as battery range, payload capacity, etc. (56%).
- Availability of makes and models of zero emission vehicles in the vehicle classes your company uses (56%).
- The purchase price of zero-emission vehicles (49%).
- Differences in technology and operation between the different types of zero emission vehicles (48%)
- The operating costs, such as fuel and maintenance, for zero emission vehicles, compared with conventional gas and diesel vehicles (48%).

Only 5% of fleet operators currently have ZEVs in their fleet. Battery-electric vehicles (41%) and plug-in hybrid electric vehicles (29%) are the most prevalent types of zero-emission vehicles in fleets currently, but a significant number of respondents with ZEVs in their fleets (30%) said they didn't know what types of ZEVs they had. No one reported having a hydrogen fuel cell vehicle.

Most fleets that have ZEVs added them in the past 2 years. Although environmental awareness was a key driver of purchases of ZEVs, the number one reason is cost savings.

Among those who do not have a ZEV in their fleet, only 16% say that their staff had experience driving ZEVs before.

Purchase Intent and Considerations

A small percentage of companies embrace the ZEV technology (3% already have ZEVs¹ and intend to purchase more and 4% fully intend to add them to their fleet). On the other hand, there are some who are unwilling to consider purchasing ZEVs (53%). There is also a key group that is interested in and considering ZEVs (35% of companies). These are the most likely future adopters if they can overcome any barriers.

¹ It should be noted that 5% reported earlier that they had ZEVs in their fleet but when asked to self-identify their companies approach not all identify as a company that has and intend to purchase ZEVs in the future.

Among companies that do not have ZEVs at this time, the main barriers to adoption are related to charging infrastructure, but a lack of opportunities to see and test drive ZEVs for their company is also considerable. The following barriers are recognized:

- Public hydrogen fueling infrastructure is either insufficient or inaccessible (80%).
- Public electric charging infrastructure is either insufficient or inaccessible (79%).
- There have been no opportunities to see, and test drive an appropriate ZEV for our company's work (74%).
- ZEVs are not available in the type(s) of vehicle(s) that our company needs (73%).
- Hydrogen fueling equipment is too expensive to install at our facilities (66%).
- Build and delivery times for ZEV are too long (57%).
- Electric charging equipment is too expensive to install at our facilities (57%).

Businesses are divided about the economic benefits of having ZEVs in their fleet. Forty-three per cent (43%) agree the company would save money with ZEVs and 53% disagree. Interestingly, 43% think that having ZEVs in their fleets would save the company money. An equal number reject this idea and 13% are not sure.

Almost one in five (16%) would be willing to pay more for a ZEV than an equivalent gas or diesel vehicle. Almost half (49%) would only purchase a ZEV if it was the same price.

Overall attitudes about ZEVs highlight some of the existing challenges with convincing fleets to adopt zero-emission vehicles. Notably, 65% agree (strongly or somewhat) that it is difficult to find credible sources of information about ZEVs. Additional barriers include:

- Battery-electric vehicles cannot travel far enough on a full charge (89%).
- A lack of availability of the make and vocation of preferred vehicles (75%).
- The make and vocation of vehicle we prefer isn't available as a ZEV (75%).
- Having ZEVs in our fleet would save our company money (43%).

Among those who are at least interested in purchasing ZEVs, the top challenges or barriers faced when actually considering a purchase of a ZEV are uncertainty about the performance (79%), access to alternative fuel charging or refuelling infrastructure (79%) and lack of trained personnel to maintain and repair these vehicles (74%). Interestingly a lack of senior management buy-in (31%) is a relatively low barrier.

1.7.2. Areas of improvement or opportunities

Current adoption levels for zero-emission vehicles among fleet operators are low. Only 5% of fleets reported that they have a ZEV at this time. Higher levels of adoption will require harnessing key attitudes among fleet organizations that are supportive of replacing existing diesel or gas-powered vehicles and removing some barriers or perceived barriers that are hindering the adoption.

Opportunities

One of the clearest opportunities is that over half of fleets would replace or add a vehicle with a new vehicle rather than a used one. Since used vehicles are unlikely to be zero emission, these replacements do not directly increase the share of ZEVs in the market. Buying new can be zero emission and about half would be

looking for new. Of those who intend to buy new, 37% are interested in and 9% either already have or definitely intend to purchase a zero-emission vehicles.

Secondly, proactive replacement of vehicles with more fuel-efficient vehicles is an important reason for companies to add a new vehicle to their fleet. Two thirds (67%) of business would retire a vehicle early to replace it with one more efficient. Leveraging the importance that people involved in fleets place on fuel efficiency as a motivator in deciding what vehicle their company buys may be important.

Third, almost half of businesses would consider adding a new vehicle to decrease their company's greenhouse gas emissions by choosing a lower-emitting vehicle option. While it is not universal, many are motivated by the value of reducing GHG emissions.

Fourth, 42% are at least interested (35% are interested and 7% either have or definitely intend to purchase) and considering purchasing a zero-emission vehicle for their fleet.

Finally, 16% are willing to pay more for a ZEV than a conventional vehicle. Government of Canada outreach and programs should target these fleets to encourage their early adoption of ZEVs.

Barriers

The two most important barriers are weak current perceptions of zero-emission vehicles and modest familiarity with how ZEVs work and would work for them. Only 13% mention a specifically positive assessment of ZEVs after being introduced to them.

Overall, there is modest familiarity with aspects of ZEVs. Just under half are at least somewhat familiar with key aspects of ZEVs such as the purchase price, the differences in technology and operation between the different types of zero emission vehicles, and the operating costs compared with conventional gas and diesel vehicles.

Related to the overall familiarity, only 16% of those who don't have an existing ZEV in their fleet think any of their staff or drivers have ever driven or ridden in a ZEV that's in a similar class of vehicle to those in their fleet. In fact, 74% acknowledge that the lack of opportunities to see and test drive an appropriate ZEV for their company's work is one of the reasons they have not acquired one. This barrier can also be framed as an opportunity for programs to support dramatically increased numbers of test drive events for fleet owners and operators in Canada.

Finally, there are barriers around the perceptions and understanding of how ZEVs would work. Attitudinally, almost everyone agrees that battery-electric vehicles can't travel far enough on a full charge to serve their operational needs. Reflecting this, the top 2 barriers or challenges when considering a ZEV are uncertainty about the performance and access to alternative fuel charging or refuelling infrastructure. Again, this barrier can be turned into an opportunity to the extent that the range of battery electric trucks that are currently available are sufficient to meet duty cycle demands. Part of addressing these barriers will also need to address the need for "credible sources of information" to support the decision-making process.

2. Detailed Findings

2.1. Fleet Purchase Intentions and Drivers

2.1.1. Plans to Purchase or Lease a New or Previously Owned Vehicle

Half of medium and heavy vehicle fleet operators (51%) intend to purchase or lease a new vehicle when it comes to adding or replacing a vehicle on their fleet. A third (31%) plan to acquire a previously owned vehicle. A small group of businesses (14%) acknowledge that their next vehicle could be either new or previously owned, and 4% are not sure.

- It is clear that largest fleets are more likely than the smaller ones to acquire a new vehicle. Small fleets lean toward previously owned vehicles.
- Ontario and Atlantic-based fleets are more likely to be purchasing or leasing a new vehicle.

Table 2.1.1.a Replacing or adding a new vehicle: lease a new or previously owned one

	TOTAL	# Vehicles in Fleet				Type of Vehicle		
Base = actual	(337)	< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
New	51%	39%	49%	60%	71%	51%	55%	42%
Previously owned	31%	42%	37%	19%	5%	27%	31%	36%
Could be new or previously owned	14%	12%	12%	18%	17%	19%	8%	17%
Don't know/ not sure	4%	7%	2%	3%	7%	2%	5%	5%

Q. When replacing or adding the next vehicle to your fleet, do you plan to purchase or lease a new or a previously owned vehicle?

Table 2.1.1.b Replacing or adding a new vehicle: lease a new or previously owned one

	TOTAL	Region						Sector	
Base = actual	(337)	BC (42)	AB (56)	SK/MB (42)	ON (89)	QC (84)	ATL (22)	Private (223)	Public (100)
New	51%	50%	41%	35%	65%	48%	74%	52%	52%
Previously owned	31%	35%	43%	40%	22%	27%	20%	29%	30%
Could be new or previously owned	14%	12%	13%	17%	11%	20%	7%	16%	12%
Don't know/ not sure	4%	4%	4%	9%	3%	5%	-	3%	6%

Q. When replacing or adding the next vehicle to your fleet, do you plan to purchase or lease a new or a previously owned vehicle?

2.1.2. Reasons for Adding a Vehicle to Fleet

The main reasons for adding a new vehicle are replacing vehicles that are at the end of their useful life (84%) and company growth (81%). Environmental considerations are secondary but it is notable that 67% report that proactive replacement (early retirement) of current vehicle with a more fuel efficient vehicle is a reason for them. Almost half see purchasing a vehicle as part of their company's efforts to reduce greenhouse gas emissions by choosing a lower-emitting vehicle option.

- Company growth is a more important reason for larger fleets.
- Efforts to reduce greenhouse gases is more likely to be a reason for Quebec and B.C. based companies.

Table 2.1.2.a. Reasons for adding a new vehicle

Base n=actual (n=337)	Yes	No	Don't know
Replacement of a current vehicle that reaches end of useful life	84%	15%	1%
Company growth	81%	18%	1%
Proactive replacement (early retirement) of current vehicle with one that will be more fuel efficient	67%	32%	1%
Efforts to decrease our company's greenhouse gas emissions by choosing a lower-emitting vehicle option	48%	49%	3%

Q. Which of the following are reasons that your company would consider adding a new vehicle to your fleet? Please answer yes or no for each one.

Table 2.1.2.b. Reasons for adding a new vehicle (% Yes) by Fleet Size and Type

	TOTAL	# Vehicles in Fleet				Type of Vehicle		
		< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
Replacement of a current vehicle that reaches end of useful life	84%	77%	84%	90%	86%	87%	86%	76%
Company growth	81%	77%	77%	86%	95%	85%	77%	81%
Proactive replacement (early retirement) of current vehicle with one that will be more fuel efficient	67%	64%	68%	70%	66%	67%	66%	67%
Efforts to decrease our company's greenhouse gas emissions by choosing a lower-emitting vehicle option	48%	47%	49%	46%	62%	52%	39%	53%

Q. Which of the following are reasons that your company would consider adding a new vehicle to your fleet? Please answer yes or no for each one.

2.1.3. Drivers of Vehicle Choice for Fleet

When it comes to deciding on what vehicle the company will purchase for its fleet, the most important factors are maintenance requirements (96% very/somewhat important), fuel efficiency (94%), and purchase or financing cost (92%). Being the right fit for their duty cycles (88%) is also of high importance.

Of somewhat lower importance for their decision is the environmental impact (72%). More than one in ten (12%) say that the environmental impact is not important at all.

A similarly much lower consideration for companies is the desire to continue to purchase the same make of vehicle that already makes up their fleet (64%). It is important for some companies but not as important as the other considerations.

The rank ordering of importance is similar across different fleet sizes and vehicle types but there are some differences:

- Companies with 50 or more vehicles place more importance on the fit for their duty cycles. For hire companies also place a higher importance on the right fit.
- Mid-size fleets (10 to 49) place a higher importance on purchasing the same make as their existing fleet.
- Vehicle purchase cost is more important for smaller fleets than for larger ones (50+).

Table 2.1.3.a. Importance in deciding on a vehicle

Base n=actual (n=337)	Very important	Somewhat important	Not very important	Not important at all	Don't know
Maintenance requirements	81%	15%	4%	-	-
Right fit for our duty cycles	72%	16%	5%	3%	4%
Fuel efficiency - cost of fuel to operate	71%	23%	4%	3%	-
Purchase/financing cost	68%	25%	5%	3%	-
Environmental impact - pollution from operation	35%	37%	15%	12%	1%
Purchasing same make of vehicle(s) as is currently in your fleet	32%	32%	24%	12%	1%

Q. How important are each of the following for you when deciding what vehicle your company will purchase for its fleet?

Table 2.1.3.b. Importance in deciding on a vehicle (%Very important) by Fleet Size and Type

	TOTAL	# Vehicles in Fleet				Type of Vehicle		
		< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
Base = actual	(337)							
Maintenance requirements	81%	74%	83%	84%	93%	76%	86%	85%
Right fit for our duty cycles	72%	68%	73%	73%	86%	63%	83%	70%
Fuel efficiency - cost of fuel to operate	71%	65%	77%	74%	57%	66%	72%	76%
Purchase/financing cost	68%	70%	66%	71%	46%	65%	64%	76%
Environmental impact - pollution from operation	35%	32%	39%	34%	37%	36%	23%	49%
Purchasing same make of vehicle(s) as is currently in your fleet	32%	29%	23%	43%	21%	36%	29%	31%

Q. How important are each of the following for you when deciding what vehicle your company will purchase for its fleet?

2.2. Impressions of Zero-Emission Vehicles (ZEVs)

2.2.1. Overall Impressions of ZEVs

Impressions of zero-emission vehicles (ZEVs)² from an open-end question are mixed with many focusing on the perceived downsides of ZEVs. For example, 34% feel that they are inefficient, especially regarding their performance in extreme weather conditions and the continuing need for charging on long-haul routes. Many (14%) believe ZEVs are too expensive and 15% believe that they are not important or are not interested.

A more optimistic view can be found among those who focus on the fact that ZEVs are important (14%) and those who think that it is something they will think about in the future (6%).

² Definition of zero-emission vehicles read to respondents before capturing their overall impressions:

“A zero-emission vehicle, or ZEV for short, is a vehicle that can be driven some or all of the time without producing tailpipe emissions. Some types of ZEVs can still have a conventional internal combustion engine but must also be able to operate without using it over some distance when the battery is charged. The Government of Canada defines ZEVs as:

- battery-electric vehicle. That is, there is no tailpipe at all
- plug-in hybrid electric vehicle
- hydrogen fuel cell vehicle from which the only tailpipe emission is water”

Table 2.2.1.a. Thoughts on Zero-Emission Vehicles (coded verbatim)

Base n=actual (n=337)	%
Inefficient/weather, charging issues	34%
Not important/not interested	15%
Too expensive	14%
Positive view/important	13%
Not widely available yet	10%
Something to think in the future	6%
Not sure	4%
Other	4%

Q. What are your thoughts on zero-emission vehicles when it comes to the types of vehicles you operate in your business?

2.2.2. Familiarity with ZEVs

When it comes to zero-emission vehicles in the vehicle classes that their company uses, awareness is highest when it comes to how the “fueling up” process works when electricity powers a vehicle instead of gas or diesel (59% very or somewhat familiar) vehicle. Only 25% are very familiar.

A majority are also familiar with the operational performance of zero-emission vehicles (56%) and the availability of ZEV models in the vehicles classes their company uses (56%). There is lower familiarity when it comes to the price (49%), the differences in technology and operations (48%) and the operating costs (48%).

Table 2.2.2.a. Familiarity with Aspects of Zero-Emission Vehicles

Base n=actual (n=337)	Very familiar	Somewhat familiar	Not very familiar	Not familiar at all
How the "fueling up" process works when electricity powers a vehicle instead of gas or diesel	25%	34%	20%	21%
Operational performance of zero-emission vehicles, such as battery range, payload capacity, etc.	23%	33%	21%	23%
Availability of makes and models of zero emission vehicles in the vehicle classes your company uses	23%	33%	18%	26%
The purchase price of zero-emission vehicles	21%	28%	21%	30%
Differences in technology and operation between the different types of zero emission vehicles	16%	33%	28%	24%
The operating costs, such as fuel and maintenance, for zero emission vehicles, compared with conventional gas and diesel vehicles	19%	29%	23%	29%

Q. Are you very familiar, somewhat familiar, not very familiar or not familiar at all with each of the following aspects of zero emission vehicles in the types of vehicle classes that your company or organization operates?

Table 2.2.2.b. Familiarity with ZEVs (% Very/Somewhat familiar) by Fleet Size and Type

	TOTAL	# Vehicles in Fleet				Type of Vehicle		
		< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
Base = actual	(337)							
How the "fueling up" process works when electricity powers a vehicle instead of gas or diesel	59%	50%	66%	63%	60%	52%	64%	64%
Operational performance of zero-emission vehicles, such as battery range, payload capacity, etc.	56%	52%	62%	56%	60%	53%	54%	63%
Availability of makes and models of zero emission vehicles in the vehicle classes your company uses	56%	49%	62%	56%	64%	52%	59%	56%
The purchase price of zero-emission vehicles	49%	49%	49%	52%	42%	50%	49%	50%
Differences in technology and operation between the different types of zero emission vehicles	48%	41%	49%	55%	41%	45%	49%	53%
The operating costs, such as fuel and maintenance, for zero emission vehicles, compared with conventional gas and diesel vehicles	48%	50%	51%	43%	48%	51%	42%	52%

Q. Are you very familiar, somewhat familiar, not very familiar or not familiar at all with each of the following aspects of zero emission vehicles in the types of vehicle classes that your company or organization operates?

There are some modest regional differences in familiarity.

- Those in Saskatchewan and Manitoba have a higher level of familiarity with the fueling up process but are less aware of the operating costs.
- Alberta and Ontario fleets are more familiar with the availability of makes and models of ZEVs that their company uses.

Table 2.2.2.c. Familiarity with ZEVs (% Very/Somewhat familiar) by Region and Sector

	TOTAL	Region						Sector	
		BC (42)	AB (56)	SK/MB (42)	ON (89)	QC (84)	ATL (22)	Private (223)	Public (100)
Base = actual	(337)								
How the "fueling up" process works when electricity powers a vehicle instead of gas or diesel	59%	66%	67%	71%	61%	45%	51%	62%	51%
Operational performance of zero-emission vehicles, such as battery range, payload capacity, etc.	56%	66%	62%	60%	61%	41%	55%	61%	45%
Availability of makes and models of zero emission vehicles in the vehicle classes your company uses	56%	59%	71%	50%	62%	41%	39%	57%	54%
The purchase price of zero-emission vehicles	49%	59%	50%	45%	51%	45%	55%	50%	44%
Differences in technology and operation between the different types of zero emission vehicles	48%	57%	50%	50%	56%	36%	36%	50%	41%
The operating costs, such as fuel and maintenance, for zero emission vehicles, compared with conventional gas and diesel vehicles	48%	60%	58%	29%	52%	41%	36%	50%	41%

Q. Are you very familiar, somewhat familiar, not very familiar or not familiar at all with each of the following aspects of zero emission vehicles in the types of vehicle classes that your company or organization operates?

2.2.3. Existing ZEVs in Fleets

Only 5% of fleet operators currently have ZEVs in their fleet. Ontario-based fleets (1%) are the least likely to report having a zero-emission vehicle in their fleet.

Table 2.2.3.a. Zero-Emission Vehicles in Fleet

	TOTAL	# Vehicles in Fleet				Type of Vehicle		
		< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
Base = actual	(337)							
Yes	5%	6%	5%	4%	5%	7%	3%	5%
No	95%	94%	95%	86%	95%	93%	97%	95%

Q. Do you currently have any zero emission vehicles in your fleet?

Table 2.2.3.b. Zero-Emission Vehicles in Fleet by Region and Sector

	TOTAL	Region						Sector	
		BC (42)	AB (56)	SK/MB (42)	ON (89)	QC (84)	ATL (22)	Private (223)	Public (100)
Base = actual	(337)								
Yes	5%	4%	8%	5%	1%	8%	-	6%	5%
No	95%	96%	92%	95%	99%	92%	100%	94%	95%

Q. Do you currently have any zero emission vehicles in your fleet?

2.2.4. Types of ZEVs in Fleets

Battery-electric vehicles (41%) and plug-in hybrid electric vehicles (29%) are the most prevalent types of zero-emission vehicles in fleets at this time. No one reported having a hydrogen fuel cell vehicle. Interestingly, 30% of those with ZEVs in their fleet didn't know what type they had, perhaps pointing to further need for awareness and education even for those organizations that have adopted ZEVs.

Table 2.2.4.a. Type of Zero-Emission Vehicles in fleet

Base n=actual (n=18)	%	n
Battery-electric vehicles	41%	10
Plug-in hybrid electric vehicles	29%	4
Hydrogen fuel cell vehicles	-	0
Don't know	30%	4

Q. Which types of zero-emission vehicles do you have in your fleet?

2.2.5. Experience (time) with ZEVs and Reason to Purchase/Lease ZEVs

Most fleets that have ZEVs added them in the past 2 years. Only one third have had one for more than 2 years.

Table 2.5.a. Years of Experience with ZEVs

Base n=actual (n=11)	%	#
Less than 1 year	18%	2
1 to 2 years	49%	5
More than 2 years	33%	4

Q. How long has your fleet had ZEVs... [coded open]

While the environment is a key driver of purchases of ZEVs, the number one reason was that it was economical.

Table 2.5.b. Reason to Purchase a ZEVs

Base n=actual (n=11)	%	#
It was economical	56%	6
Thinking about the environment	40%	4
Stay up to date	4%	1

Q. What were the primary reasons you decided to purchase or lease ZEVs for your company's fleet? [Coded open]

2.2.6. Experiencing Driving ZEVs Among Non-Users

Among those who do not have a zero-emission vehicle in their fleet, only 16% say that their staff have experience driving ZEVs before.

Table 2.2.6 Staff/Driver Experience Driving ZEVs in Similar Class

Base n=actual (319)	%
Yes	16%
No	83%
Don't know	1%

Q. [IF NO/NOT SURE FOR ZEV IN FLEET] Have you or, to your knowledge, any of your staff or drivers ever driven or ridden in a ZEV that's in a similar class of vehicle to those in your fleet?

2.3. ZEV Purchase Intent and Considerations

2.3.1. Overall Approach to Adding ZEVs

When it comes to adding zero-emission vehicles to their fleets, some companies embrace the technology (3% already have ZEVs and fully intend to purchase more and 4% intend to purchase ZEVs) while others clearly are reluctant or unwilling to consider purchasing ZEVs. Notably, 53% are not interested in and have not considered purchasing a ZEV. A middle group who are interested in and considering ZEVs (35% of companies) are the most likely to be future adopters if they can overcome any barriers.

- Large fleets are the least likely to be unwilling and the most likely to already have intentions (9%) or be interested in purchasing a ZEV (44%).

Table 2.3.1.a. Situation with Zero-Emission Vehicles in Fleet by Fleet Size and Type

	TOTAL (337)	# Vehicles in Fleet				Type of Vehicle		
		< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
We're not interested and have not considered purchasing a zero-emission vehicle for our fleet.	53%	61%	50%	51%	31%	53%	60%	43%
We are interested and are considering purchasing a zero-emission vehicle	35%	26%	42%	39%	43%	34%	32%	43%
We fully intend to purchase or lease additional zero-emission vehicles	4%	1%	3%	6%	13%	4%	2%	8%
We already have one or more zero emission vehicles in our fleet, and we intend to add more	3%	5%	1%	3%	2%	3%	2%	3%
Don't know	5%	7%	4%	2%	11%	6%	5%	3%

Q. Which of the following best describes your company's current situation with respect to adding zero-emission vehicles to your fleet? (choose one)

Table 2.3.1.b. Situation with Zero-Emission Vehicles in Fleet by Region and Sector

	TOTAL (337)	Region						Sector	
		BC (42)	AB (56)	SK/MB (42)	ON (89)	QC (84)	ATL (22)	Private (223)	Public (100)
We're not interested and have not considered purchasing a zero-emission vehicle for our fleet	53%	33%	62%	54%	55%	53%	55%	50%	62%
We are interested and are considering purchasing a zero-emission vehicle	35%	52%	24%	38%	39%	31%	38%	36%	29%
We fully intend to purchase or lease additional zero-emission vehicles	4%	5%	5%	5%	3%	3%	3%	5%	2%
We already have one or more zero emission vehicles in our fleet, and we intend to add more	3%	1%	5%	-	1%	6%	-	3%	4%
Don't know	5%	10%	5%	4%	2%	6%	3%	6%	3%

Q. Which of the following best describes your company's current situation with respect to adding zero-emission vehicles to your fleet? (choose one)

2.3.2. Reason Non-users Have Not Added A ZEV

There are clearly barriers for many companies in making the move to zero-emission vehicles for their fleets. Among companies that do not have a zero-emission vehicle, the principal reasons for not yet to adding a zero-emission vehicle to their fleet is charging infrastructure. Insufficient public hydrogen fuelling infrastructure (80%) and insufficient electric charging infrastructure (79%) are identified most often.

A lack of opportunities to see and test drive an appropriate ZEV for their company's work is also a key barrier (74%). This is consistent with the low level of experience with ZEVs at the companies in question.

The lack of availability either of the type(s) of vehicle(s) that their company needs (73%) or in terms of the lengthy build and delivery times for ZEVs (57%) also are key barriers for many fleets. The cost of installing charging equipment is of similar significance to availability. The cost of installing hydrogen fuelling equipment (66%) is more of a challenge than for installing electric charging equipment (57%).

- Fleets of different sizes and types generally perceive the barriers to be the same. Mid-sized fleets (10-49) are more likely to mention the length of build and delivery times for ZEVs. Large fleets are less likely to be mention the cost of installing electric charging and hydrogen fuelling equipment at their facilities.
- Among those who are interested in ZEVs, the barriers are similar except in two cases. Those interested are more likely to mention a lack of opportunities to test drive and the fact that build and delivery times are too long.

Table 2.3.2.a. Reasons Non-Users Have Not Added a Zero-Emission Vehicle

Base n=actual (n=326)	Yes	No	Don't know
Public hydrogen fuelling infrastructure is either insufficient or inaccessible	80%	12%	8%
Public electric charging infrastructure is either insufficient or inaccessible	79%	16%	5%
There have been no opportunities to see and test drive an appropriate ZEV for our company's work	74%	24%	3%
ZEVs are not available in the type(s) of vehicle(s) that our company needs	73%	22%	6%
Hydrogen fuelling equipment is too expensive to install at our facilities	66%	20%	15%
Build and delivery times for ZEV are too long	57%	30%	12%
Electric charging equipment is too expensive to install at our facilities	57%	33%	10%

Q. [IF NOT A USER] Which of the following considerations are the reasons why your company has not yet decided to add a zero-emission vehicle to your fleet? Please answer yes or no for each one

Table 2.3.2.b. Reasons Non-Users Have Not Added a Zero-Emission Vehicle (% Yes) by Fleet Size and Type

Base n=actual (n=326)	TOTAL	# Vehicles in Fleet				Type of Vehicle		
		< 5 (87)	5 - 9 (78)	10 - 49 (129)	50+ (29)	Private (116)	For Hire (115)	Both (90)
Public hydrogen fuelling infrastructure is either insufficient or inaccessible	80%	76%	84%	83%	65%	73%	83%	85%
Public electric charging infrastructure is either insufficient or inaccessible	79%	77%	78%	84%	68%	73%	85%	81%
There have been no opportunities to see and test drive an appropriate ZEV for our company's work	74%	66%	81%	73%	80%	59%	83%	80%
ZEVs are not available in the type(s) of vehicle(s) that our company needs	73%	76%	69%	74%	65%	72%	72%	76%
Hydrogen fuelling equipment is too expensive to install at our facilities	66%	75%	61%	64%	41%	60%	69%	69%
Build and delivery times for ZEV are too long	57%	54%	51%	69%	36%	56%	51%	69%
Electric charging equipment is too expensive to install at our facilities	57%	61%	51%	63%	24%	45%	62%	67%

Q. [IF NOT A USER] Which of the following considerations are the reasons why your company has not yet decided to add a zero-emission vehicle to your fleet? Please answer yes or no for each one

Table 2.3.2.c. Reasons Non-Users Have Not Added a Zero-Emission Vehicle By Interest in ZEVs

	All non-users	Non-users interested in ZEVs
Base n=actual (n=326)	(326)	(127)
Public hydrogen fuelling infrastructure is either insufficient or inaccessible	80%	82%
Public electric charging infrastructure is either insufficient or inaccessible	79%	74%
There have been no opportunities to see and test drive an appropriate ZEV for our company's work	74%	80%
ZEVs are not available in the type(s) of vehicle(s) that our company needs	73%	71%
Hydrogen fuelling equipment is too expensive to install at our facilities	66%	62%
Build and delivery times for ZEV are too long	57%	69%
Electric charging equipment is too expensive to install at our facilities	57%	53%

2.3.3. Attitudes about ZEVs

Overall attitudes about ZEVs among companies and organizations with fleets highlight some of the existing challenges with convincing fleets to adopt zero-emission vehicles. Most notably, three quarters strongly agree and 14% somewhat agree that battery-electric vehicles cannot travel far enough on a full charge (90%). A lack of availability of the make and vocation of preferred vehicles (75%) is also a secondary barrier. A majority of companies also struggle to find credible sources of information about ZEVs.

Interestingly, 43% think that having ZEVs in their fleets would save the company money. An equal number reject this idea and 13% are not sure.

- Alberta fleets are more likely than others to think than ZEVs can't travel far enough on a full charge.

Table 2.3.3.a. Statements about Zero-Emission Vehicles

Base n=actual (n=337)	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree	Don't know
Battery-electric vehicles can't travel far enough on a full charge to serve our company's operational needs	75%	14%	5%	3%	2%
The make and vocation of vehicle we prefer isn't available as a ZEV	50%	25%	7%	9%	8%
It is difficult to find credible sources of information about ZEVs	29%	36%	19%	11%	5%
Having ZEVs in our fleet would save our company money	28%	15%	14%	29%	13%

Q. Please indicate whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with each of the following statements about zero emission vehicles

Table 2.3.3.b. Statements about Zero-Emission Vehicles (% Strongly/Somewhat agree) by Fleet Size and Type

	TOTAL (337)	# Vehicles in Fleet				Type of Vehicle		
		< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
Battery-electric vehicles can't travel far enough on a full charge to serve our company's operational needs	90%	87%	87%	94%	90%	88%	94%	87%
The make and vocation of vehicle we prefer isn't available as a ZEV	75%	73%	76%	77%	75%	75%	75%	79%
It is difficult to find credible sources of information about ZEVs	65%	63%	62%	69%	73%	60%	68%	71%
Having ZEVs in our fleet would save our company money	43%	40%	47%	42%	35%	45%	33%	51%

Q. Please indicate whether you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements about zero emission vehicles

Table 2.3.3.c. Statements about Zero-Emission Vehicles (% Strongly/Somewhat agree) by Region and Sector

	TOTAL	Region						Sector	
		BC (42)	AB (56)	SK/MB (42)	ON (89)	QC (84)	ATL (22)	Private (223)	Public (100)
Base = actual	(337)								
Battery-electric vehicles can't travel far enough on a full charge to serve our company's operational needs	90%	78%	99%	96%	88%	90%	87%	89%	91%
The make and vocation of vehicle we prefer isn't available as a ZEV	75%	75%	84%	88%	71%	66%	84%	78%	71%
It is difficult to find credible sources of information about ZEVs	65%	69%	66%	73%	71%	52%	74%	66%	68%
Having ZEVs in our fleet would save our company money	43%	50%	35%	42%	40%	49%	32%	45%	38%

Q. Please indicate whether you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements about zero emission vehicles

2.3.4. Cost of Buying New Vehicles for Fleets

16% would be willing to pay more for a ZEV than an equivalent gas or diesel vehicle. If the price was about the same as an equivalent conventional vehicle almost half (49%) would purchase the ZEV. A quarter (27%) would purchase a ZEV if the price was lower than an equivalent conventional vehicle.

- Willingness to pay more is generally consistent across organizational differences. Companies with fleets of less than 5 or between 10 and 49 trucks are more likely to buy if the price is lower.
- Regionally, a willingness to pay more was highest in BC (19%), QC (20%) and ATL (19%).
- Those who have a positive outlook toward ZEVs are much more willing to pay a premium (25% among those who intent to purchase) and are less likely to need the price to be lower.

Table 2.3.4.a. Views on the cost of buying Zero-Emission Vehicles by Fleet Size and Type

	TOTAL	# Vehicles in Fleet				Type of Vehicle		
		< 5 (91)	5 - 9 (80)	10 - 49 (133)	50+ (30)	Private (120)	For Hire (118)	Both (94)
We would be willing to pay more for a zero-emission vehicle than an equivalent gas or diesel vehicle	16%	13%	19%	16%	27%	22%	15%	8%
We would only buy a zero-emission vehicle if the price were about the same as an equivalent conventional vehicle	49%	47%	59%	43%	62%	46%	49%	56%
We would only buy a zero-emission vehicle if the price were lower than an equivalent conventional vehicle	27%	31%	17%	32%	7%	22%	30%	28%
Don't know	8%	10%	5%	9%	4%	11%	6%	7%

Q. With regards to the cost of buying a new vehicle for your fleet, which of the following statements is closest to your company's point of view?

Table 2.3.4.b. Views on the cost of buying Zero-Emission Vehicles by Region and Sector

	TOTAL (337)	Region						Sector	
		BC (42)	AB (56)	SK/MB (42)	ON (89)	QC (84)	ATL (22)	Private (223)	Public (100)
We would be willing to pay more for a zero-emission vehicle than an equivalent gas or diesel vehicle	16%	19%	13%	15%	13%	20%	19%	17%	14%
We would only buy a zero-emission vehicle if the price were about the same as an equivalent conventional vehicle	49%	54%	42%	37%	53%	54%	51%	49%	54%
We would only buy a zero-emission vehicle if the price were lower than an equivalent conventional vehicle	27%	22%	34%	41%	25%	18%	26%	26%	25%
Don't know	8%	5%	11%	7%	9%	7%	3%	8%	7%

Q. With regards to the cost of buying a new vehicle for your fleet, which of the following statements is closest to your company's point of view?

Table 2.3.4.c. Views on the cost of buying Zero-Emission Vehicles by Attitude about ZEVs

	Company Attitude about ZEVs			
	We're not interested and have not considered purchasing a zero-emission vehicle for our fleet (185)	We are interested and are considering purchasing a zero-emission vehicle (116)	We fully intend to purchase or lease additional zero-emission vehicles (11)	We already have one or more zero emission vehicles in our fleet and we intend to add more (11)
We would be willing to pay more for a zero-emission vehicle than an equivalent gas or diesel vehicle	9%	23%	25%	33%
We would only buy a zero-emission vehicle if the price were about the same as an equivalent conventional vehicle	44%	57%	62%	41%
We would only buy a zero-emission vehicle if the price were lower than an equivalent conventional vehicle	36%	16%	13%	13%
Don't know	11%	4%	0%	13%

Q. With regards to the cost of buying a new vehicle for your fleet, which of the following statements is closest to your company's point of view?

2.3.5. Barriers when Considering Purchase of ZEVs

Among those who are at least interested in purchasing ZEVs, the top challenges or barriers that come up when considering the purchase of a ZEV for their fleet are general uncertainty about the performance of ZEVs (79%), access to charging/refuelling infrastructure (79%), and lack of trained personnel to maintain and repair these vehicles (74%).

There is also barriers related to uncertainty about the return on investment (66%), competing priorities (66%) and a lack of knowledge (60%) for some companies. Notably, senior management buy-in (31%) is a relatively low barrier.

About one in five mentioned that there were other barriers. Primarily these were mentions of no vehicles/parts available (9 mentions), that ZEVs are too expensive with taxes and insurance (7 mentions), additional issues with a lack of charging (6 mentions) and a lack of training for drivers and companies (1 mention).

While identified barriers are similar across fleets, there are some differences.

- Smaller fleets are more likely to identify lack of funds and lack of human resources.
- The largest fleets (50 or more) are more likely to identify a lack of trained personnel to maintain and repair vehicles.
- A lack of senior management buy-in is more likely to be an issue for those with 5 to 9 vehicles.
- For-hire fleets are more likely to view uncertainty about the return on investment, uncertainty about the performance and access to alternative fuel charging as a challenge or barrier.

Table 2.3.5.a. Challenges when considering Zero-Emission Vehicles

Base n=actual (n=138)	Yes	No
Uncertainty about the performance	79%	21%
Access to alternative fuel charging or refuelling infrastructure	79%	21%
Lack of trained personnel to maintain and repair these vehicles	74%	26%
Uncertainty about the return on investment	66%	34%
Competing operational priorities	66%	34%
Lack of knowledge	60%	40%
Lack of human resources or time	52%	48%
Lack of funds	46%	54%
Concerns that ZEV would disrupt our operations	44%	56%
Lack of senior management buy-in	31%	69%
Anything else	18%	82%

Q. Which of the following challenges or barriers, if any, has your company encountered when considering the purchase of a ZEV for your fleet?

Table 2.3.5.b. Challenges when considering Zero-Emission Vehicles (% Yes) by Fleet Size and Type

	TOTAL	# Vehicles in Fleet				Type of Vehicle		
		< 5 (30)	5 - 9 (38)	10 - 49 (54)	50+ (16)	Private (54)	For Hire (38)	Both (47)
Base = actual	(138)							
Uncertainty about the performance	79%	64%	81%	87%	85%	67%	95%	79%
Access to alternative fuel charging or refuelling infrastructure	79%	82%	69%	84%	81%	65%	87%	89%
Lack of trained personnel to maintain and repair these vehicles	74%	68%	71%	74%	100%	66%	82%	75%
Uncertainty about the return on investment	66%	66%	51%	77%	66%	53%	84%	64%
Competing operational priorities	66%	66%	58%	68%	82%	57%	70%	74%
Lack of knowledge	60%	60%	52%	67%	59%	51%	72%	60%
Lack of human resources or time	52%	56%	54%	50%	35%	50%	51%	52%
Lack of funds	46%	58%	53%	37%	21%	46%	39%	50%
Concerns that ZEV would disrupt our operations	44%	40%	47%	48%	21%	41%	44%	47%
Lack of senior management buy-in	31%	42%	12%	39%	22%	28%	35%	28%
Anything else	18%	19%	12%	20%	21%	23%	20%	11%

Q. Which of the following challenges or barriers, if any, has your company encountered when considering the purchase of a ZEV for your fleet?

2.4. Company Approach to New Vehicles and Eco-driving Training

2.4.1. New Vehicle Technologies

The approach that fleets are taking with respect to ZEVs is largely aligned with how they approach other fuel saving technologies. The 7% who have or intend to purchase a ZEV aligns with the 12% who think of themselves as early adopters. There are still self-perceived early adopters who have not committed to ZEVs but most have done so.

Table 2.4.a. Company's views on New Vehicle Technologies

Base n=actual (n=337)	%
We are early adopters of technologies who earn a good return on investment on technologies	12%
We test and adopt fuel-saving technologies after seeing evidence of their effectiveness in other fleets	21%
We purchase mature, proven fuel-saving technologies only if there is overwhelming evidence of their return-on-investment	37%
We don't consider fuel-saving technologies if they increase costs because the return-on-investment is difficult to quantify	30%

Q. How would you identify your company's approach to adopting new vehicle technologies? Choose one statement from the following:

2.4.2. Eco-driving Training

One in three (35%) indicate that they offer eco-driving training to their drivers.

Table 2.4.b. Eco-driving training to drivers

Base n=actual (n=337)	%
Yes	35%
No	64%
Don't know	1%

Q. Does your company offer eco-driving training to its truck drivers?

Among those who offer eco-driving training, 39% offer less than 10 hours per year and 42% offer 11 to 49 hours.

Table 2.4.c. Eco-driving training to drivers

Base n=actual (n=126)	%
None	8%
Less than 10 hours	39%
11-50 hours	42%
50+ hours	7%
Don't Know / Refused	4%

Q. For each driver, approximately how many hours per year does your company allocate for eco-driving training? Is it...

2.5. Respondent Profile

Table 2.5.a. Type of fleet

Base n=actual (n=337)	%
Private	37%
For hire	34%
Both	27%
Don't know / Refused	2%

Q. Is your fleet:

Table 2.5.b. Number of drivers in your company

Base n=actual (n=337)	%
Less than 4	26%
5-9	17%
10-49	23%
50+	5%
Don't Know / Refused	1%

Q. How many drivers does your company employ?

Table 2.5.c. Number of trucks in your company fleet

Base n=actual (n=337)	%
Less than 5	33%
5 to 9	26%
10 to 49	35%
50+	6%
Don't Know	1%

Q. How many trucks are in your company's fleet?

Table 2.5.4. Type of trucks in your company fleet

Base n=actual (n=337)	%
Refrigerated / Package / Specialized / Expedited / Tanker / Flatbed / Mixed	68%
Dry van	43%
Heavy haul	39%
Auto-carrier	7%
Garbage trucks	6%
Cubed van	24%
Work truck	33%
Other	18%
Don't Know / Refused	-

Q. Which of the following trucks are in your fleet?

Table 2.5.e. Number of trucks in your company fleet

Base n=actual (n=337)	%
Last mile	29%
Regional Delivery	68%
Long haul	64%
Don't Know / Refused	1%

Q. Are your trucks used for...

Table 2.4.f. Average: trucks less than five years

Base n=actual (n=337)	%
Average	57.4

Q. What percentage of trucks in your fleet are less than five years old?

3. Methodology

3.1. Methodological Overview

A telephone survey was conducted between October 14 and November 16, 2022, among commercial, institutional and government fleet owners and operators.

The sample was based on a list of Canadian freight transportation industry businesses belonging to general freight: local (NAICS code 484110), general freight: long distance (NAICS codes 484121 & 484122), and specialized freight trucking; excluding used goods (NAICS codes 484220 & 484230).

A total of 337 telephone surveys were completed, with a margin of error of +/- 5.3, and with data weighted by NAICS code.

Table 3.1.a Completes

NAICS Code	Completes
General freight trucking, local (484110)	129
General freight trucking, local distance (484121 & 484122)	75
Specialized freight trucking (484220 & 484230)	133
Total	337

Questionnaire

The questionnaire (both English and French) was developed by Abacus Data in close consultation with Natural Resources Canada to ensure that the survey captured the key areas of interest around current use and understanding of zero-emission vehicles as well as the barriers to purchase. The survey took on average 17 minutes to complete.

Survey Pretest

The telephone survey pretest was completed between October 14 and 17, 2022 by Leger. Twenty interviews were completed (10 in each official language) under live field conditions. Overall, the pretest went very well, the questions were understood and not confusing, except for one issue with missing skip logic that was easily addressed. Pretest results were kept in the final data as changes did not impact the results.

Non-response Bias

The response rate for this survey was 15.9%. In order to maximize response Leger on behalf of Abacus Data undertook the following:

- A minimum of 8 call backs were made before retiring a number.
- Call backs took place at different times and days in order to maximize the possibility of getting a respondent when they are available.
- Flexible appointments and call backs were offered so respondents could take the survey at the most convenient time for them.

There is a possibility of non-response bias, which is introduced because certain types of individuals may be more or less likely to respond to the survey. The survey does not, for example, include members of the population who only work on weekends or who may have been ill or on leave during the field period. In addition, there are some groups within the population that are systemically less likely to answer surveys.

To address the issue of non-response bias, data were weighted to be representative of the population of the different NAICS codes that apply to the freight transportation businesses in Canada.

Weighting

Weighting adjustments were applied to the final edited, clean data to ensure that the data were representative of freight transportation businesses in Canada. The weighting matrix for this project is based on the population numbers (unique businesses in Canada) as provided by the list provider in the three NAICS groups. The three groups are: general freight: local (484110), general freight: long distance (484121 & 484122), and specialized freight trucking excluding used goods (484220 & 484230)

Table 3.1.c. Weighting Matrix

NAICS Code	Actual		Weighted	
	%	n	%	n
General freight trucking, local (484110)	38	129	48	162
General freight trucking, long distance (484121 & 484122)	22	75	39	131
Specialized freight trucking (484220 & 484230)	39	133	13	44
Total	100	337	100	337

Margin of Error

A total of 22,862 were available and a sample size of 337 provides a margin of error of +/- 5.3 at 19 times out of 20 (95% confidence level).

Response Rate

A total of 17,656 numbers were dialled, of which n=337 completed the survey. The overall response rate achieved for the telephone study was 15.9%. The following table outlines the sample disposition and response rate.

Table 3.1.d. Response Rate Calculation

Total Numbers Attempted	17,656
Invalid	4204
NIS	4116
Fax/Modem	45
Business/Non-residential	43
Unresolve (U)	6742
Busy	210
No answer	3866
Answering machine	2666
In-Scope - Non-responding (IS)	4565
Illness, incapable	40
Selected, respondent not available	2289
Household refusal	n/a
Respondent refusal	2162
Qualified respondent break-off	74
In-scope - Responding units (R)	2145
Language disqualifies	190
No one 18+	0
Quota full	15
Other disqualify	1603
Completed interviews	337
Response Rate = R/(U+IS+R)	15.9%

Tabulated Data

Detailed tables are included under separate cover.

4. Appendix: Survey Instrument

Medium and Heavy-Duty Vehicles (MHDV) Fleet Awareness, Knowledge and Attitudes Related to Zero-Emission Vehicles (ZEVs) Survey

INTRO. Gatekeeper Introduction

Hello, can I speak to someone at your company who is involved in or knowledgeable about the process of vehicle purchasing or leasing for your organization's fleet?

IF NECESSARY-

Hello/Bonjour my name is [INSERT NAME], from Leger. We are currently conducting a survey on behalf of Natural Resources Canada and are speaking to people who have knowledge about vehicle management, use and purchasing within the freight transportation industry.

The results of this study will help inform future public policy and program design on clean energy technology, including the role of zero-emission vehicles (ZEV) in freight transportation, and protecting the environment.

Can I speak to the person who is involved in or knowledgeable about vehicle management, use and purchasing within your company's fleet of vehicles?

The purpose of the survey is to learn more about perspectives and understanding of zero-emission vehicles in the heavy-duty trucking industry. The feedback received will be used by the Natural Resources Canada to inform program and policy development and to address several Government of Canada priorities, including investing in zero-emission vehicles to deliver benefits for the environment and the economy, including jobs. As part of this survey, you will be asked to give your opinion. Your participation is completely voluntary and your decision whether or not to participate will not affect any dealings you may have with the Government of Canada.

INTRO: Respondent Introduction

Hello/Bonjour my name is [INSERT NAME], from Leger. We are currently conducting a survey on behalf of the Government of Canada and are speaking to people who have knowledge about vehicle management, use and purchasing within the freight transportation industry. The results of this study will help inform future public policy on clean energy technology, including the role of zero-emission vehicles (ZEV) in freight transportation, and protecting the environment.

[If NECESSARY: Should you wish to verify the legitimacy of this survey you may contact xxx@abacusdata.ca]

Your participation is voluntary, and your responses will be kept entirely confidential and anonymous and the information you provide will be administered according to the requirements of the Privacy Act, the Access to Information Act, and any other pertinent legislation.. This survey will take about 15 minutes to complete.

Would you prefer that I continue in English or French? Préférez-vous continuer en français ou en anglais?

-English -French

SCREENING

1. Which of these best describes your role in the vehicle management, use and purchasing of vehicles within your company's fleet of vehicles?

1 – I am the key decision maker for my company's fleet

2 – I am involved in, or give input in decisions for my company's fleet

3 – I am knowledgeable about my company's fleet, but am not involved in decisions

4 – I am not knowledgeable about, or involved in any decisions for/about my company's fleet [DOES NOT QUALIFY]

2. [IF NOT QUALIFIED 4 @ Q1] Can you direct me to someone at your company that does manage vehicle use and purchasing?

Yes- loop back to Respondent Introduction with this new person

No- "Can I please speak to your receptionist again" Loop back to Gatekeeper introduction
No one at my company is knowledgeable - TERMINATE

3. Does your company operate freight transportation trucks?

- Yes
- No- TERMINATE

INTERVIEWER INSTRUCTION: IF ASKED WHAT FREIGHT TRANSPORTATION TRUCKS ARE: THESE TYPICALLY INCLUDE HEAVY AND LIGHT DUTY TRUCKS USED FOR MOVING GOODS – VANS DO NOT COUNT BUT 18 FOOT LONG DELIVERY VEHICLES LIKE THE LARGE UPS OR PUROLATOR TRUCKS DO

4. Which of the following best describes your organization?

- Public sector
- Private sector
- Not-for-profit
- Other

Main Survey – Purchase Intentions and Drivers

5. When replacing or adding the next vehicle to your fleet, do you plan to purchase or lease a new or a previously owned vehicle?

- New
- Previously-owned
- Could be new or previously-owned
- Don't know/not sure

6. Which of the following are reasons that your company would consider adding a new vehicle to your fleet? Please answer yes or no for each one. [RANDOMIZE LIST]

[INTERVIEWER: READ LIST AND PAUSE FOR A YES/NO AFTER EACH]

- Replacement of a current vehicle that reaches end of useful life
- Company growth
- Proactive replacement (early retirement) of current vehicle with one that will be more fuel efficient
- Efforts to decrease our company's greenhouse gas emissions by choosing a lower-emitting vehicle option

Yes

No

DON'T KNOW (DO NOT READ)

7. How important are each of the following for you when deciding what vehicle your company will purchase for its fleet? Would you say they are very important, somewhat important, not very important or not important at all?

- Right fit for our duty cycles
- Maintenance requirements
- Purchase/financing cost
- Fuel efficiency – cost of fuel to operate
- Purchasing same make of vehicle(s) as is currently in your fleet
- Environmental impact – pollution from operation

Very important

Somewhat important

Not very important

Not important at all

DON'T KNOW (DO NOT READ)

MAIN SURVEY – ZERO EMISSION VEHICLES

[READ TEXT] A zero-emission vehicle, or ZEV for short, is a vehicle that can be driven some or all of the time without producing tailpipe emissions. Some types of ZEVs can still have a conventional internal combustion engine but must also be able to operate without using it over some distance when the battery is charged.

The Government of Canada defines ZEVs as:

- battery-electric vehicle. That is, there is no tailpipe at all
- plug-in hybrid electric vehicle
- hydrogen fuel cell vehicle from which the only tailpipe emission is water

8. What are your thoughts on zero-emission vehicles when it comes to the types of vehicles you operate in your business?

[OPEN TEXT]

9. Are you very familiar, somewhat familiar, not very familiar or not familiar at all with each of the following aspects of zero emission vehicles in the types of vehicle classes that your company or organization operates? [RANDOMIZE LIST]

- How the “fueling up” process works when electricity powers a vehicle instead of gas or diesel
- Availability of makes and models of zero emission vehicles in the vehicle classes your company uses
- Operational performance of zero-emission vehicles, such as battery range, payload capacity, etc.

- Differences in technology and operation between the different types of zero emission vehicles, that is, between battery electric vs hydrogen fuel cell vehicles, for example
- The purchase price of zero-emission vehicles
- The operating costs, such as fuel and maintenance, for zero emission vehicles, compared with conventional gas and diesel vehicles

Very familiar

Somewhat familiar

Not very familiar

Not familiar at all

10. Do you currently have any zero emission vehicles in your fleet?

INTERVIEWER TO REMIND AS NEEDED WHAT A ZEV IS: battery-electric vehicle, plug-in hybrid electric vehicle, hydrogen fuel cell vehicle

- Yes
- No
- DON'T KNOW (DO NOT READ)

11. [IF YES FOR ZEV IN FLEET] Which types of zero-emission vehicles do you have in your fleet?

- battery-electric vehicles
- plug-in hybrid electric vehicles
- hydrogen fuel cell vehicles
- DON'T KNOW (DO NOT READ)

12. [IF NO/NOT SURE FOR ZEV IN FLEET] Have you or, to your knowledge, any of your staff or drivers ever driven or ridden in a ZEV that's in a similar class of vehicle to those in your fleet?

- Yes/No/Not sure

13. Which of the following best describes your company's current situation with respect to adding zero-emission vehicles to your fleet (choose one)

- We're not interested and have not considered purchasing a zero-emission vehicle for our fleet.
- We are interested and are considering purchasing a zero-emission vehicle
- We fully intend to purchase or lease additional zero-emission vehicles
- We already have one or more zero emission vehicles in our fleet and we intend to add more.
- DON'T KNOW (DO NOT READ)

14. [IF NOT A USER] Which of the following considerations are the reasons why your company has not yet decided to add a zero-emission vehicle to your fleet? Please answer yes or no for each one.

[RANDOMIZE LIST]

[INTERVIEWER: READ LIST AND PAUSE FOR A YES/NO AFTER EACH]

- There have been no opportunities to see and test drive an appropriate ZEV for our company's work
- Build and delivery times for ZEV are too long
- Public electric charging infrastructure is either insufficient or inaccessible

- Public hydrogen fuelling infrastructure is either insufficient or inaccessible
- Electric charging equipment is too expensive to install at our facilities
- Hydrogen fuelling equipment is too expensive to install at our facilities
- ZEVs are not available in the type(s) of vehicle(s) that our company needs

Yes

No

DON'T KNOW (DO NOT READ)

15. Please indicate whether you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements about zero emission vehicles.

- It is difficult to find credible sources of information about ZEVs
- Battery-electric vehicles can't travel far enough on a full charge to serve our company's operational needs
- The make and vocation of vehicle we prefer isn't available as a ZEV
- Having ZEVs in our fleet would save our company money

Strongly agree

Somewhat agree

Somewhat disagree

Strongly disagree

DON'T KNOW (DO NOT READ)

16. With regards to the cost of buying a new vehicle for your fleet, which of the following statements is closest to your company's point of view?

- We would be willing to pay more for a zero emission vehicle than an equivalent gas or diesel vehicle
- We would only buy a zero emission vehicle if the price were about the same as an equivalent conventional vehicle
- We would only buy a zero emission vehicle if the price were lower than an equivalent conventional vehicle
- DON'T KNOW (DO NOT READ)

17. [IF USER OR ADOPTER] Which of the following challenges or barriers, if any, has your company encountered when considering the purchase of a ZEV for your fleet? Please answer yes or no for each one. [RANDOMIZE LIST]

[INTERVIEWER: READ LIST AND PAUSE FOR A YES/NO AFTER EACH]

- Lack of funds
- Uncertainty about the performance
- Concerns that ZEV would disrupt our operations
- Lack of knowledge
- Lack of human resources or time
- Competing operational priorities
- Lack of trained personnel to maintain and repair these vehicles
- Lack of senior management buy-in
- Uncertainty about the return on investment
- Access to alternative fuel charging or refuelling infrastructure

k. Anything else, please specify? _____ (specify) – KEEP LAST

18. [IF A USER] How long has your fleet had ZEVs
[OPEN TEXT]

19. [IF A USER] What were the primary reasons you decided to purchase or lease ZEVs for your company's fleet?
[OPEN TEXT]

DEMOGRAPHICS

We are almost done, just a few more questions for classification purposes.

20. In which province is your office located?

- [LIST PROVINCES]
- DK/Refused

21. Is your fleet: [Read List]

- Private
- For hire
- Both
- DK/Refused (DO NOT READ)

22. How many drivers does your company employ? [Read List if they do not know exact amount]

- Less than 4
- 5-9
- 10-49
- 50+
- Don't Know/Refused (DO NOT READ)

23. How many trucks are in your company's fleet?

- [Numeric box to enter number in]
- DON'T KNOW [DO NOT READ]

24. Which of the following trucks are in your fleet? [Read list]

- Refrigerated Package Specialized Expedited Tanker Flatbed Mixed
- Dry van
- Heavy haul
- Auto-carrier
- Garbage trucks
- Cubed van
- Work truck
- Other
- DK/Refused (DO NOT READ)

25. Are your trucks used for... [Read list]

- Last mile
- Regional Delivery
- Long haul
- DK/Refused (DO NOT READ)
-

26. What percentage of trucks in your fleet are less than five years old?

- [NUMERIC OPEN- RANGE 0-100]
- DON'T KNOW [DO NOT READ]

27. How would you identify your company's approach to adopting new vehicle technologies? Choose one statement from the following:

- a. We are early adopters of technologies who earn a good return on investment on technologies
- b. We test and adopt fuel-saving technologies after seeing evidence of their effectiveness in other fleets
- c. We purchase mature, proven fuel-saving technologies only if there is overwhelming evidence of their return-on-investment
- d. We don't consider fuel-saving technologies if they increase costs because the return-on-investment is difficult to quantify

28. Does your company offer eco-driving training to its truck drivers?

- Yes
- No
- DK/Refused

29. [IF OFFERS ECO-DRIVING TRAINING] For each driver, approximately how many hours per year does your company allocate for eco-driving training? Is it... [read list]

- None
- Less than 10 hours
- 11-50 hours
- 50+ hours
- DK/Refused (DO NOT READ)

End display

Thank you for your time on this important study! The results, once compiled, can be found on the Library and Archives website. [IF ASKED: at <https://www.bac-lac.gc.ca/>].