



2019 ENERGY LEADERSHIP SERIES

THE STATE OF COMMERCIAL FLEET ELECTRIFICATION | [WWW.MORTENSON.COM/EV](http://WWW.MORTENSON.COM/EV)

# ELECTRIC VEHICLE INDUSTRY TRENDS

  
**Mortenson**<sup>®</sup>

# 2019 ELECTRIC VEHICLE SURVEY

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## ABOUT THIS STUDY

We are in pivotal times for the clean transportation industry. Investments in zero and near-zero emission vehicles for public and private fleets are growing, and fleet owners are balancing the costs and benefits of converting their conventional combustion fleets to clean technology.

To understand the dynamics facing fleet and transit owners in their clean transportation journey, we surveyed over 200 professionals at the 2019 Advanced Clean Transportation Expo. Survey participants are leaders at the forefront of clean transportation adoption and include public and private-sector fleet owners, policymakers, public infrastructure establishers, and the suppliers who support them.

Mortenson, a national leader in the engineering, procurement, and construction of renewable energy and other electric infrastructure, is pleased to share the insights we learned from the survey about the types of clean transportation that fleet and transit owners are incorporating into their organizations and the challenges they face in the process.

## CONTENTS

- 4** **The Shift Toward Clean Transportation**
- 7** **All Signs Point to Electrification**
- 12** **Infrastructure is the Biggest Barrier**
- 13** **Other Roadblocks in the Way**
- 16** **Drivers of Adoption**

# OWNERS ARE TRANSITIONING THEIR FLEETS TO CLEAN TECHNOLOGIES AND ELECTRIFICATION IS THE FUTURE

## CLEAN TRANSPORTATION IS COMING

**48%** of fleets will be clean in 5–7 years

**23%** of today's fleets are clean

### Key Drivers of Clean Transition:

- Emerging technologies
- Environmental responsibility
- Organization goals

## ELECTRIC FLEETS ARE THE PREFERRED OPTION

**60%** of owners say electric is the best clean transportation option

**80%** say ranges will meet needs within 5 years

### Fleet owners cite reasons including zero emissions, innovation, and customer preference.

Fleet owners did not cite cost savings, however, significant potential exists, as we're seeing examples of fuel savings with projects across the country.

## THE BARRIER TO ELECTRIC TRANSPORTATION

**#1** barrier to clean transportation is infrastructure

### In consideration of fleet electrification, infrastructure is not assessed early enough.

To understand capital expenditure, operational cost, and schedules, infrastructure needs must be evaluated early in the process.

**90%** of fleet owners have undergone or will undergo a feasibility study regarding electrification.

Start with a feasibility study. With expertise in real estate development, commercial construction, and energy and infrastructure, Mortenson can help you assess project sites, understand electrical upgrades needed, and determine the potential cost and schedule for electric vehicle infrastructure projects. Furthermore, we can help you plan for today and tomorrow.

## FLEET OWNERS ARE EMBRACING NEW TECHNOLOGY

Both public and private fleet owner survey participants indicated they are well on their way to becoming fully engaged and committed to adopting clean transportation vehicles into their fleet. In fact, fleet owners and operators at the Advanced Clean Transportation Expo who participated in this study anticipate that half of their fleet will be clean in 5 to 7 years — double what it is today.



AVERAGE OF FLEET OWNER RESPONSES TO:

**On a scale of 1 to 10, where is your organization at regarding clean transportation vehicles?**

1

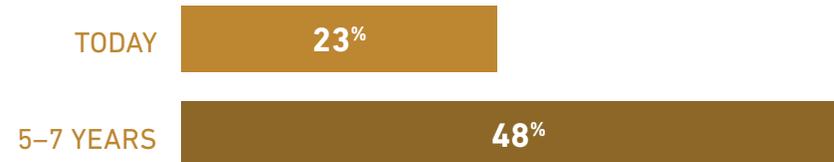
JUST STARTING TO LEARN

7

10

FULLY ENGAGED & COMMITTED

**Approximately what percent of your fleet is comprised of clean transportation today, compared to what you anticipate in 5–7 years?**



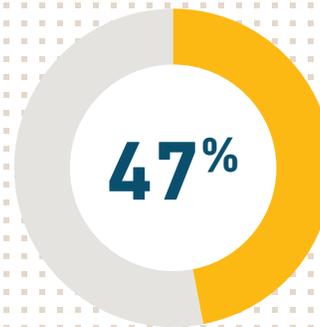
## WHAT IS DRIVING ADOPTION?

The desire for organizations to reduce their carbon footprint and the drive to meet certain initiatives were most frequently cited as the reasons fleet owners are shifting toward clean transportation. Organizations are also influenced by government mandates to incorporate clean transportation technology into their fleets.



FLEET OWNERS RESPONSES TO:

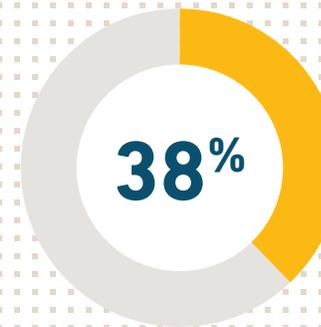
**Can you briefly describe why your organization is interested in clean transportation vehicles?\***



ENVIRONMENTAL RESPONSIBILITY

**Make progress on our carbon footprint program.**

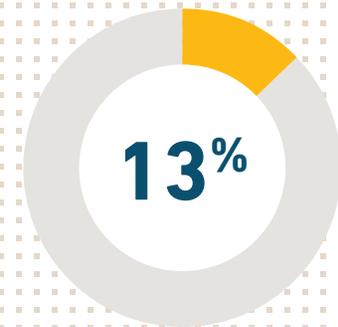
**The city is interested in mitigating impact to the environment.**



ORGANIZATIONAL GOALS/INITIATIVES

**Efficiency — both lower emissions and lower Total Cost of Ownership.**

**Fuel savings.**



GOVERNMENT MANDATES

**Mandated by the federal government to have alternative fuel vehicles in the fleet.**

\* Percent of all responses. Coded responses to open-ended question.

## OPERATING COST IMPACT

From installation to charging costs and ongoing maintenance, there are many considerations for fleet owners to factor into the bottom line. Most fleet owners who participated in the study do not expect a significant reduction in operating costs for new clean technology vehicles compared to what they spend today. The fact that fleet owners plan to shift much more of their fleets to electric vehicles even though they do not anticipate a large reduction in future costs speaks to the fact that other considerations are driving the transition.



FLEET OWNERS RESPONSES TO:

**What will be the average operating cost of clean transportation vehicles 5 years from now compared to today?**



**At the same time, compelling results from early adopters of all-electric buses show potential for significant fuel and maintenance savings that can add up over time.**

Analysis reported by the U.S. PIRG Education Fund shows the potential for \$400,000 in lifetime savings for electric buses compared to their diesel counterparts.<sup>1</sup> Of course, results will be variable for each unique fleet, but the cost savings seen from these early studies are encouraging.

<sup>1</sup>U.S. PIRG Education Fund, Paying for Electric Buses - Financing Tools for Cities and Agencies to Ditch Diesel, Fall 2018. Retrieved from: <https://uspig.org/reports/usp/paying-electric-buses>

## AMONG CLEAN TRANSPORTATION ALTERNATIVES, ELECTRIC IS PREFERRED

Of the clean transportation technologies available today, including electric, compressed natural gas, hybrid, propane, and hydrogen/fuel cell, electric vehicles are the preferred choice. Industry professionals believe electric vehicles are the cleanest technology available and provide a favorable cost of ownership. They also anticipate we will see improvements in battery technology and more affordable purchase prices.

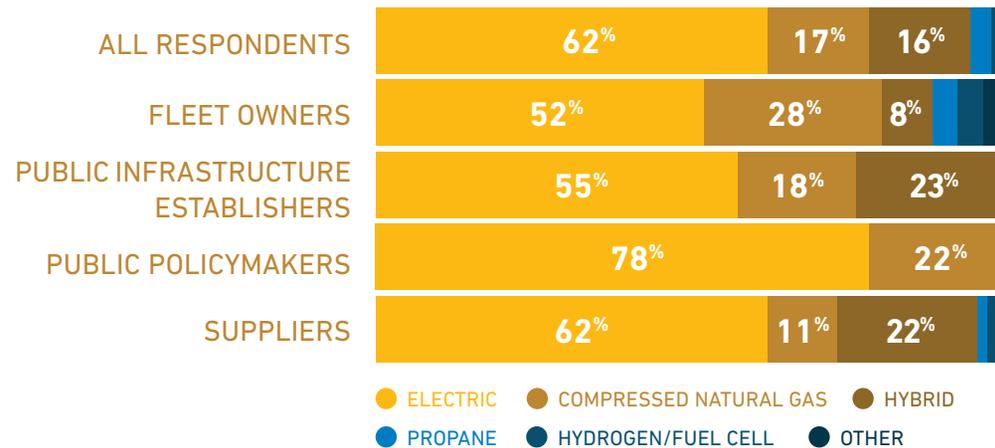


ALL RESPONSES TO:

**Which clean transportation technology will be the best option for your fleet (or jurisdiction or customers) over the next 5–7 years?**

**3** OUT OF **5**

**Respondents say electric is the best clean transportation technology option. At the same time, there is a noticeable minority of fleet owners who see advantages in compressed natural gas.**





SELECT QUOTES FROM ALL RESPONDENTS:

**Can you briefly describe why you think the technology you selected is best?**

### MOST PREFERRED

#### Electric

- “We are well within range of being able to make round trips using battery technology only with our truck fleets.”
- “Availability of charging at workplace.”
- “Zero emissions, battery technology advancements, existing utility infrastructure.”
- “Supportive funding is available.”
- “Affordability, consumer acceptance, diversity of products.”
- “Most innovation is around electric vehicles.”

### 2ND MOST PREFERRED

#### Compressed Natural Gas

- “Access to fuel and availability of vehicles, like school buses.”
- “We already have an established infrastructure for this technology. Other technology infrastructures are still evolving.”
- “Best infrastructure”
- “We are a natural gas City Department and are mandated to use those type of vehicles.”
- “It will take longer than 5–7 years to change the status quo.”
- “The most affordable and proven technology with the largest network of filling points.”

### A BRIDGE TO ELECTRIC?

#### Hybrid

- “I believe a full electric future will come in 10–20 years from now, so hybrid vehicles will be the first part of that larger transition.”
- “Lack of charging infrastructure limits applications where full electric or hydrogen make sense nationally.”
- “Good compromise for all conditions.”
- “Easy to integrate and no change is necessary.”
- “Efficiency is high and cost is low.”

## RANGE ANXIETY IS EASING

Range anxiety has been a barrier for electrification of transportation, but advancements in technology are helping to increase the range of electric vehicles. In fact, some predictions estimate the average range of fully electric cars available in the U.S. by 2022 will be around 275 miles and could reach 400 miles by 2028.<sup>2</sup>

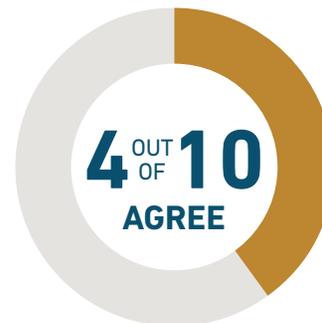
Survey respondents are optimistic about improvements to electric vehicle capabilities on the horizon.



FLEET OWNERS RESPONSES TO:

**Do you agree or disagree with the following statements regarding electric vehicle range?**

TODAY



ELECTRIC VEHICLES HAVE A CURRENT RANGE THAT MEETS MY NEEDS

WITHIN 5 YEARS



ELECTRIC VEHICLES WILL MEET OUR REQUIREMENTS WITHIN 5 YEARS

<sup>2</sup> U.S. Electric Car Range Will Average 275 Miles by 2022, 400 Miles by 2029 - New Research (Part 1) <https://cleantechnica.com/2018/10/27/us-electric-car-range-will-average-275-miles-by-2022-400-miles-by-2028-new-research-part-1/>

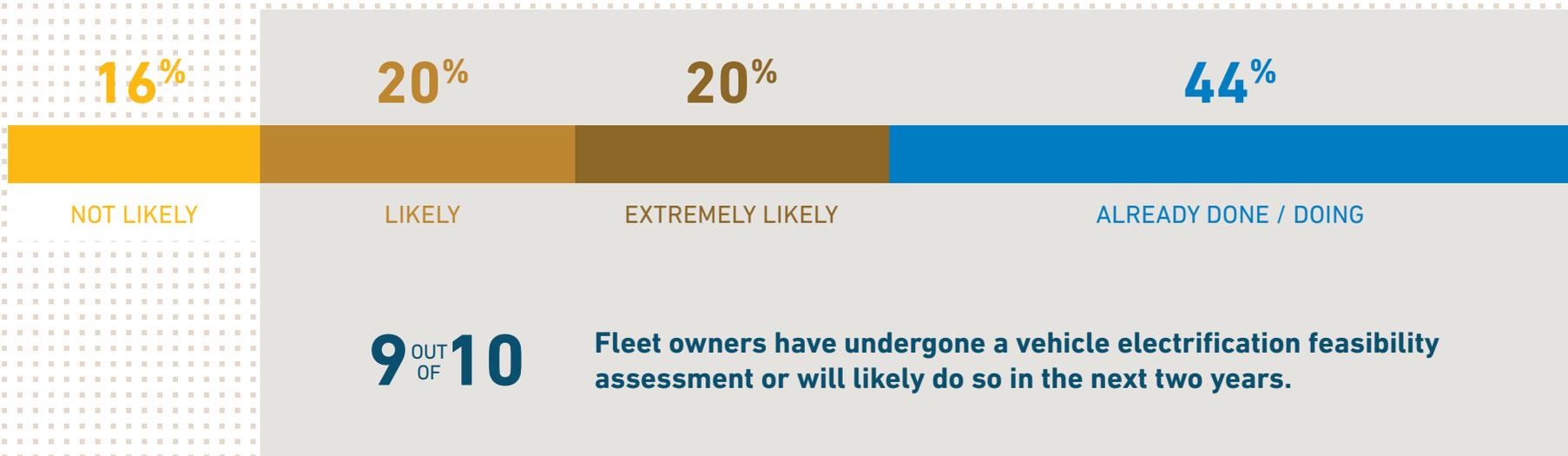
## IS ELECTRIFICATION RIGHT FOR ME?

Many fleet owners are formally weighing the pros and cons of electrifying their fleet or will do so in the near future. It is imperative to look beyond the environmental benefits and the conversion costs of electric vehicles versus the status quo. The cost of implementation and construction should be taken into consideration in order to truly understand long-term operational and lifecycle costs.



FLEET OWNERS RESPONSES TO:

**Within the next two years, how likely is it that your organization will undergo a feasibility assessment regarding vehicle electrification?**



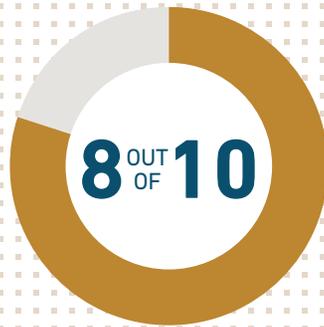
## A VERSATILE TECHNOLOGY

Vehicle electrification is gaining traction among the public sector for the versatile range of applications the technology can meet. Infrastructure to support electric city buses, trash hauling trucks, cars, trucks and even bikes is underway.



CODED RESPONSES TO OPEN-ENDED QUESTION (PUBLIC INFRASTRUCTURE ESTABLISHERS):

**Can you briefly describe the clean transportation infrastructure your organization is most likely to establish?**



PUBLIC INFRASTRUCTURE ESTABLISHERS SAY THEIR ORGANIZATION IS MOST LIKELY TO ESTABLISH INFRASTRUCTURE TO SUPPORT ELECTRIFICATION, EITHER EXCLUSIVELY OR IN COMBINATION WITH ANOTHER TYPE OF CLEAN TRANSPORTATION.

### Infrastructure is being developed to support:

- Electric trucks/freight equipment
- Electric buses
- Trash trucks
- Electric cars
- Electric bikes
- EV charging stations
- Solar for transportation
- Fueling networks
- EV charging network software
- Interoperable networks among utilities, cities and workplaces

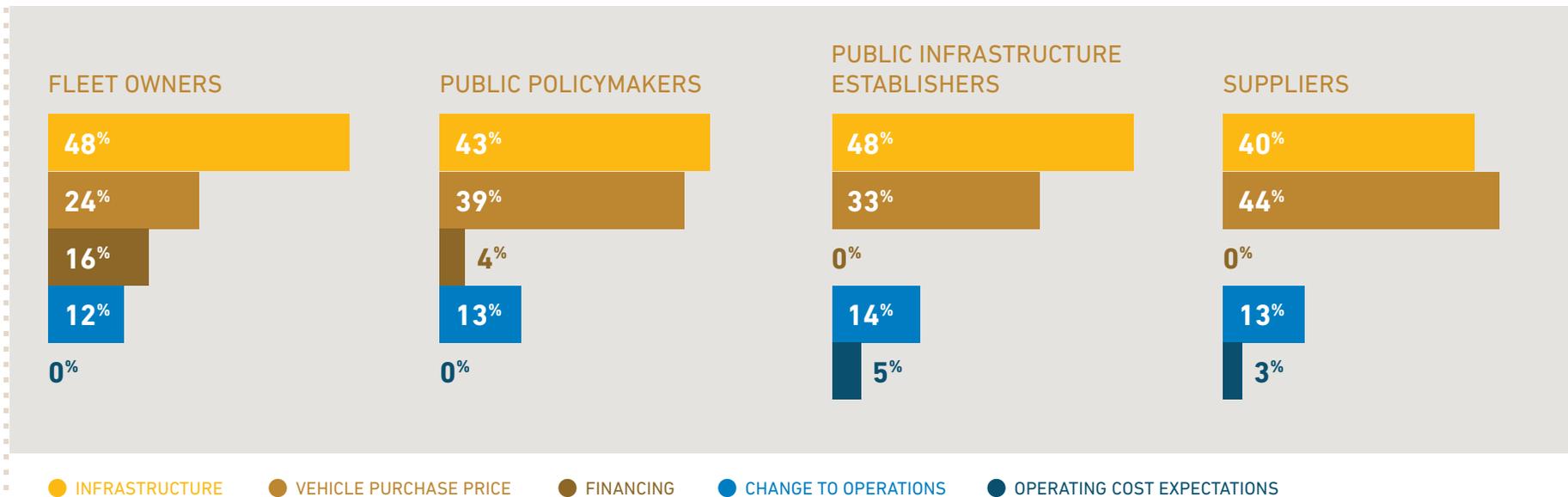
## INFRASTRUCTURE IS THE BIGGEST BARRIER

Despite the optimism for electrification, challenges remain. Across the board, industry professionals see infrastructure and vehicle purchase price as the biggest hurdles to transitioning to clean technology vehicles. In fact, nearly half of the fleet owners ranked infrastructure as the biggest barrier to widespread adoption. When owners and operators begin to assess electrification, they often begin with selecting vehicles. However, the successful implementation of electric vehicles is dependent on making the right decisions about infrastructure and technology. Every project is unique and has varying needs for electrical upgrades, schedules, utility planning and charging platforms. Disruption of operations is also a challenge that must be addressed.



TOTAL OF ALL RESPONSES TO:

**Which barrier do you think will create the most challenge in terms of transitioning to clean technology vehicles?**



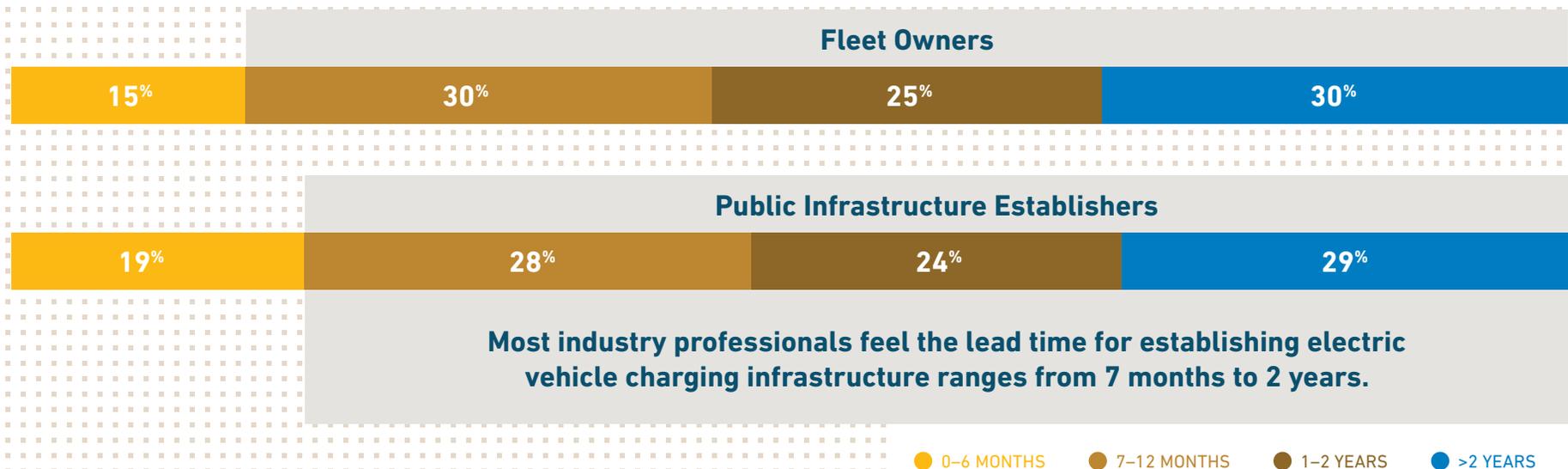
## IT'S A TIME COMMITMENT

Electrification requires infrastructure development and it can be difficult for fleet owners to justify the time commitment needed to get the necessary infrastructure up and running. While development timeframes can vary, most industry professionals know they may need up to two years to establish the electric vehicle infrastructure they need.



TOTAL OF FLEET OWNER AND PUBLIC INFRASTRUCTURE ESTABLISHER RESPONSES TO:

**If your organization/jurisdiction makes the decision to establish electric vehicle charging infrastructure, how long would you estimate it will take you to implement it?**





SELECT QUOTES FROM ALL RESPONDENTS:

**What is the biggest challenge you must overcome to adopt clean transportation?**

**We need a better knowledge of equipment and help to develop proper infrastructure at our facilities.**

**As of yet, all existing solutions are not as simple as refueling petroleum. Time is money and charging takes a long time.**

**Availability of vehicles which meet this need. We have a need for larger utility vehicles and there aren't many options on the market.**

**Range is still too low. Charging infrastructure not developed. Charging time is too long. Cost of battery replacement is too high.**

**Uncertainty around residual values.**

**Infrastructure costs when new power source needs to be brought in to a facility.**

**Range anxiety.**

**Charging infrastructure.**

**End user resistance and range/charging limitations.**

**Infrastructure and initial costs.**

**After cost of the technology and infrastructure, it's ensuring that the clean vehicles can still get the job done.**

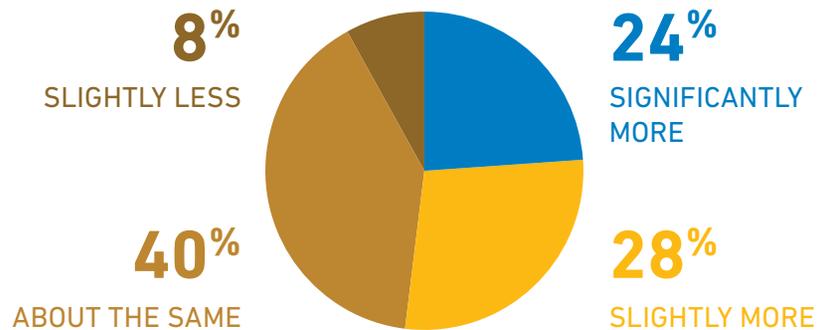
## CAPITAL EXPENSE COULD DETER ENTRY

Although the upfront cost of electric vehicles is beginning to fall, the purchase price continues to be a barrier for fleet owners who are considering converting their fleet from conventional fuels to electric. Emerging models — such as a third-party financing, ownership and/or management of electric vehicles and infrastructure — can help overcome capital constraints and manage risk while providing cost certainty.



FLEET OWNER RESPONSES TO:

**How do you think initial costs for clean transportation alternatives compare to what you spend today?**



**About half of fleet owners anticipate upfront costs for clean transportation will be higher than what they spend today, while 40% think costs will stay about the same.**

## GOVERNMENT SUPPORT IS CRUCIAL

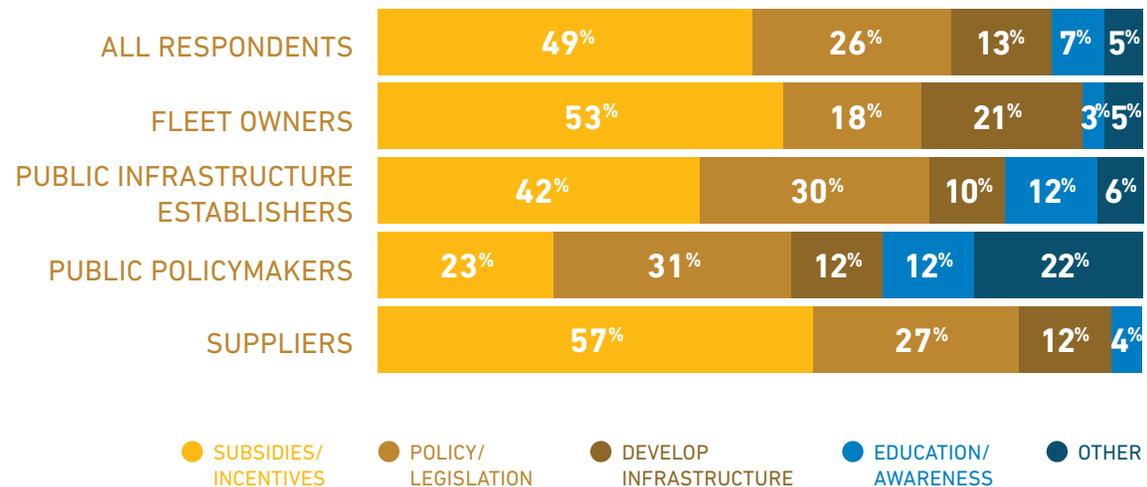
Despite optimism that the operating expenses of clean transportation vehicles will decline, respondents still believe that government subsidies and incentives are needed to further the adoption of clean transportation technology.



CODED RESPONSES TO ALL RESPONSES TO OPEN-ENDED QUESTION:

**Can you briefly describe the main things government/your organization is or should be doing to support adoption of clean transportation vehicles?**

**Industry professionals believe subsidies and legislation are the most important actions government should be taking to support clean transportation vehicle adoption.**





SELECT QUOTES FROM ALL RESPONSES TO AN OPEN-ENDED QUESTION:

**Can you briefly describe the main things government is or should be doing to support the adoption of clean transportation vehicles?**

#### SUBSIDIES/INCENTIVES

- “Grants to support organizations that purchase clean transportation vehicles. The grant should assist the organization with front-end costs.”
- “Provide funding for developing technologies and commercial deployments.”
- “Providing incentives to offset the cost of the vehicle, infrastructure and charging costs associated with an electric vehicle.”

#### DEVELOP INFRASTRUCTURE

- “Streamline the infrastructure permitting process and provide funding.”
- “Allocating infrastructure funding to cover initial R&D for modernization and then transition to implementation.”
- “Support fueling infrastructure.”
- “Supplement the cost of installing nationwide infrastructure.”

#### POLICY/LEGISLATION

- “Keep promoting electric vehicles and push for public policy that facilitates installation of infrastructure.”
- “Clear long-term policies to guide deployment.”
- “Regulate to force more rapid change.”

#### EDUCATION/AWARENESS

- “We are engaging with companies to drive uptake and education on clean vehicles.”
- “Become more educated on alternative technology, availability and feasibility for operations.”
- “Evangelize the technology and value proposition.”

## CURRENT NEEDS NOT BEING MET

Industry professionals overwhelmingly agree that today's public/utility incentives are not sufficient to support widespread adoption of clean transportation vehicles. Even public policymakers feel incentives fall short of the need.



ALL RESPONSES TO:

**What degree of public/utility incentives are needed to better accommodate the growth of clean transportation vehicles?**

### Owners



### Public Infrastructure Establishers



### Public Policymakers



### Suppliers



● SUBSTANTIALLY MORE ● MODERATELY MORE ● SLIGHTLY MORE ● TODAY'S MANDATES ARE SUFFICIENT

## INCENTIVES NEEDED FOR ANOTHER DECADE

The need for government support is not expected to dissipate any time soon. Industry professionals agree that public/utility incentives will be needed for another eight to twelve years — or until about 2030.



AVERAGE RESPONSE BY AUDIENCE TO:

**How many years before public/utility incentives will no longer be needed to support adoption of clean transportation vehicles?**

### Fleet Owners



### Public Infrastructure Establishers



### Public Policymakers



### Suppliers



# MORTENSON ENERGY SOLUTIONS - ELECTRIC VEHICLE CHARGING

**Choosing the right electric vehicle charging infrastructure and planning early is critical as you electrify your fleet.**

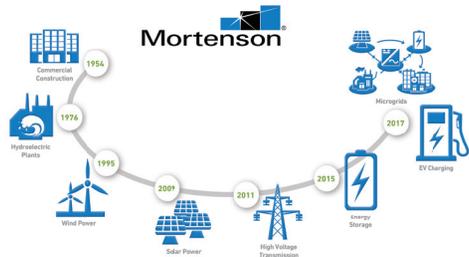
**INFRASTRUCTURE IS #1 BARRIER TO ELECTRIFICATION.**

Infrastructure may include chargers, electrical upgrades, renewables to balance load, and storage to manage demand charges along with software. Infrastructure may also include commercial building structures.

**INFRASTRUCTURE SHOULD BE DISCUSSED EARLY.**

The wrong infrastructure will cost money, time, and disrupt operations. As a key driver of total cost of ownership, infrastructure planning should begin when electrification is first considered.

**Mortenson is a national leader in commercial construction, real estate development, and energy infrastructure.**



Engineering News-Record Rankings

|                    |     |
|--------------------|-----|
| Wind               | #1  |
| Solar              | #2  |
| Power              | #4  |
| General Contractor | #16 |

**How we can help:**

- 1 FEASIBILITY STUDY**  
Engage Mortenson to help you understand cost, schedule, and develop an implementation plan.
- 2 ENGINEERING, PROCUREMENT AND CONSTRUCTION**  
You can leverage one firm to execute your project on time and on budget, whether large or small.
- 3 OPERATIONS AND MAINTENANCE**  
With a team of technicians and software partners, we can ensure you reduce operating cost while maintaining your assets.

# ENERGY AND INFRASTRUCTURE EXPERIENCE YOU CAN RELY ON

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At Mortenson, we've been helping fleet owners and operators navigate the complex decisions around powering their electric fleets. We have been working with eBus vendors and utilities, leveraging our experience building some of America's largest transportation hubs and high voltage infrastructures.

Our customers engage Mortenson to help them determine if there is a case for vehicle electrification. We evaluate the environmental and cost impacts, identify the best technical solution, and map out how electrification will impact their bottom line. We also help our customers by designing and building electric vehicle charging infrastructure.

We are committed to finding new innovations and ways to deliver projects that enhance the success of our customers. We welcome the opportunity to share more with you about our expertise, knowledge, and unique capabilities to provide world-class service.

### What's Next in Energy®

Mortenson is a U.S.-based, top-20 builder, developer, and engineering services provider serving the commercial, institutional, and energy sectors. Mortenson's expanding portfolio of integrated services helps its customers move their strategies forward, ensuring their investments result in high-performing assets. The result is a turnkey partner, fully invested in the business success of its customers.

Founded in 1954, Mortenson has operations across the U.S. with offices in Chicago, Denver, Fargo, Iowa City, Milwaukee, Minneapolis, Phoenix, Portland, San Antonio, Seattle, and Washington, D.C. For additional information, visit [www.mortenson.com/ev](http://www.mortenson.com/ev).

### MORTENSON CAN HELP

To learn more, please get in touch with one of our EV professionals.



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