How EV battery recycling can fill the gap in critical minerals.

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RMI Analysis: With Smart Policy, Truck Electrification Is Within Reach

An analysis of 15 states that have adopted or are in the process of adopting the Advanced Clean Trucks regulation shows that 60 percent of medium-duty trucks and 43 percent of heavy-duty trucks are electrifiable today.

December 5, 2023

By Olivia Alves, Emily Porter, Nocona Sanders, Ari Kahn

RMI Analysis: With Smart Policy, Truck Electrification Is Within Reach

In the United States, the transportation sector contributes more greenhouse gas (GHG) emissions than any other. Given that medium- and heavy-duty (MHD) trucks account for only 10 percent of vehicles on the road, yet produce almost a quarter of the sector's emissions, it's clear that truck electrification will be critical to meeting climate goals.

To accelerate adoption, an increasing number of stakeholders are exploring how policy can help address commonly cited barriers to truck electrification, including fleets' concerns about the cost of electric trucks, electric trucks' ability to meet operational needs, and whether the electric grid can adequately provide for the charging needs of electric trucks.

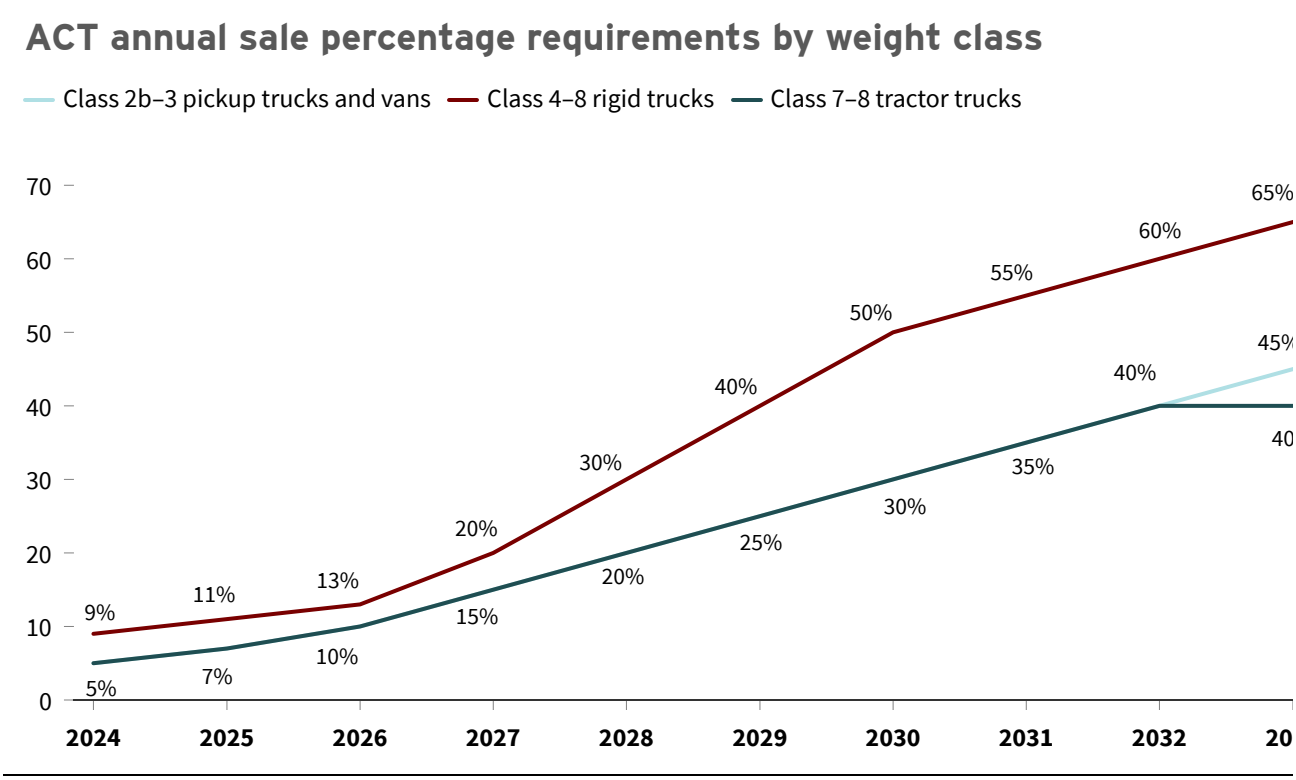
To address these concerns, RMI analyzed one year of trucking telematics data in 15 states that have adopted or are working to adopt the Advanced Clean Trucks (ACT) regulation to understand how trucks currently operate and to quantify electrification potential. The profiled states have all signed the

Advanced Clean Trucks Memorandum of Understanding (MOU) that requires 30 percent of MHD vehicle sales be zero-emissions vehicles (ZEVs) by 2030, with a goal of 100 percent ZEV adoption by 2050. Some states have enacted the MOU, while others are still working on adoption.

We found that, on average in these areas, 60 percent of medium-duty (MD) trucks and 43 percent of heavy-duty (HD) trucks are electrifiable today.

What Is the Advanced Clean Trucks (ACT) Regulation?

To understand the results of RMI's analysis, it's important to know what the ACT regulation does. First adopted in California in 2020 to combat truck emissions, ACT requires original equipment manufacturers (OEMs) of MHD vehicles to sell ZEVs or near-zero-emissions vehicles (NZEVs) such as plug-in electric hybrids as an increasing percentage of their annual sales from 2024 to 2035 to achieve 100 percent sales of electric trucks by 2050. The regulation uses a cap-and-trade system, capping the number of fossil fuel vehicles sold by stipulating annual sales percentage requirements. The rule allows manufacturers to comply with the regulation by generating compliance credits through the sale of ZEVs or NZEVs or through the trading of compliance credits. For further background on ACT please review RMI's article Understanding California's Advanced Clean Truck Regulation.



Common Questions About Truck Electrification

RMI's analysis helps answer the pressing questions about truck electrification.

Can electric trucks and charging capabilities meet operational needs?

In many cases, yes.

RMI defines electrifiable trucks (i.e., trucks that could be electrified in the next three years) as those that drive 300 miles or less before returning to a home base. These criteria — limited travel distance and return to a fixed base — are chosen for two reasons:

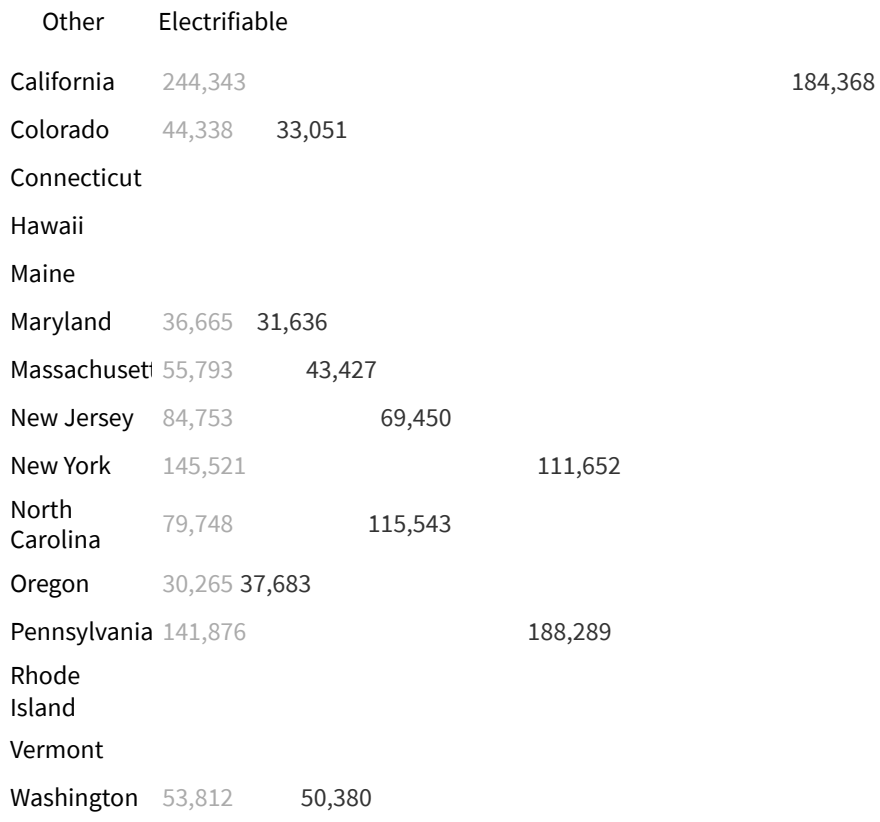
1. While some of today's electric trucks are capable of driving up to 500 miles on a single charge, others are capped at 100–200 miles. The 300-mile cutoff aims to reflect the capabilities of currently available electric truck models.
2. Today public and/or shared charging infrastructure for electric trucks is limited, so most electric trucks must rely on depot-based charging.

It's important to note that electric truck ranges are expected to increase in the coming years as battery technology improves and costs decline. Extended

ranges and more charging infrastructure will increase the market for electric trucks.

RMI found that in the 15 assessed ACT states, 60 percent of MD trucks and 43 percent of heavy-duty HD trucks are electrifiable today. Below, you can see how many trucks are easily electrifiable in each of the ACT states.

Truck population by state



Can the grid handle truck electrification?

Given that full truck electrification would increase national yearly electricity consumption by almost 10 percent, it's understandable that many are concerned that the grid may not be able to power electric fleets. As electric truck adoption increases, fleets, utilities, and regulators are working to understand how to optimize business practices, strengthen grid infrastructure, and improve charging and operational design to reduce trucks' energy use.

Initial truck electrification will likely exert only a moderate strain on our power grids. Looking at regions considering ACT, RMI assessed the potential repercussions on the grid of electrifying *all* trucks that are electrifiable with existing models. With mostly overnight charging, there would be a 5 percent

rise in energy consumption for trucks suited for electrification. In the areas analyzed, peak power demand could surge anywhere from nearly nothing up to 14 percent, averaging around 3 percent. However, these figures might fluctuate based on the charging tactics employed, and each region possesses its unique attributes that will influence the optimal charging method. Despite the need for thoughtful grid management and investment, overall grid capacity should not deter ACT implementation. However, local impacts of truck charging aggregated on a small number of feeders can present challenges, highlighting the need for fleets to begin fleet electrification conversations with their utilities as early as possible.

That said, many short- and medium-haul trucks have relatively low energy needs and therefore are easier to electrify than many believe. RMI found that these electrifiable trucks regularly spend 16 hours per day parked at a depot and 8 hours driving. These long depot dwell times are well suited to slow, low-powered charging. RMI found that half of these electrifiable trucks would be able to use Level 1 and Level 2 chargers (i.e., less than 25 kW) if electrified. The benefit of using these lower-powered chargers is that they minimize burden on the grid and are more affordable to install.

How much do electric trucks help public health and air quality?

Electrifying trucks offers profound environmental and community benefits beyond just curbing greenhouse gas emissions. RMI analysis projects that transitioning to electric trucks across all ACT states would **avert 477 premature deaths and curtail 6,194 asthma incidents annually. This translates to a staggering health benefit of $5.3 billion**.

It's crucial to highlight that communities of color and lower-income households are disproportionately situated near trucking facilities. Truck electrification is a pivotal step forward, albeit one that addresses only some aspects of the broader challenges associated with environmental racism. In addition to air pollution-associated health risks from diesel trucks, electric trucks don't produce the engine and brake noises that can degrade quality of life and adversely impact health.

\re electric trucks affordable?

While RMI's most recent analysis did not cover trucks' affordability, it's a common enough concern to address here. The Inflation Reduction Act (IRA), passed in 2022, has greatly reduced the price of electric trucks through its Qualified Commercial Vehicle Tax Credit, which provides up to $40,000 in tax credits for the purchase of electric trucks. This significant tax credit shows the power of policy to advance truck electrification. RMI predicts that, thanks to the IRA, electric short- and medium-haul trucks' total cost of ownership will be lower than that of their diesel counterparts five years sooner than if the law had not been passed. Truck makers such as Tesla have noted that driving electric can save hundreds of thousands of dollars in fuel over the course of its time on the road. And by as soon as 2030, more than 60 percent of new truck sales could be electric.

The Qualified Commercial Tax Credit is just one of many available sources of funding; state and federal grants and vouchers also make trucks more affordable. (For more detailed information on funding for electric trucks, check out this article from Mike Roeth, director of the North American Council for Freight Efficiency.)

The Power of Policy

Existing federal, state, and local policies play a key role in accelerating electric truck adoption by creating:

- Voluntary incentives like tax credits and grant and loan programs to make it more affordable to purchase, charge, and produce electric trucks;
- Enforceable rules that require automotive companies and other stakeholders to produce vehicles that reduce emissions; and
- Market certainty that encourages private investors and automotive companies to fully embrace electric vehicles.

Over the past two years there has been groundbreaking investment in clean transportation from the federal government through two key pieces of federal legislation: the Bipartisan Infrastructure Law (BIL) and the IRA.

The chart below provides an overview of key federal and state policies that upport MHD electric truck adoption.

For more information on this analysis please check out RMI's Early Trucking Electrification in ACT States dashboard.

US Medium- and Heavy-Duty Electric Truck Policy

Policy	Policy Description	Policy Lever	Industry Impact
FEDERAL			
Environmental Protection Agency (EPA) Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3	Fleet-wide standard for the GHG pollution an HDV or engine can emit for vehicle manufacturers. New proposed rule currently in rulemaking process set to be finalized in 2024.	Regulation	Proposed rule would be EPA's most stringent standards yet as it requires a shift in manufacturing toward EVs.
National Highway Traffic Safety Administration (NHSTA) Corporate Average Fuel Economy (CAFE) Standards	Fleet-wide average fuel-economy standards for vehicle manufacturers for light-, medium-, and heavy-duty vehicles.	Regulation	Shift production of more fuel-efficient fleets and can encourage EV manufacturing transition.
Federal Highway Administration (FHWA) National Electric Vehicle Infrastructure (NEVI) Formula Program	$5 billion formula funding program established in BIL for states to build EV charging infrastructure along highway corridors — prioritizes rural and disadvantaged communities.	Funding program	Funds charging stations around the country, makes charging more accessible, and advances the industry.
FHWA Charging and Fueling Infrastructure (CFI) Grant Program	$2.5 billion in competitive grant program established in BIL to build EV charging stations.	Funding program	Funds charging stations around the country, makes charging more accessible, and advances the industry.
EPA Clean Ports Program	$3 billion IRA program to fund zero-emissions port equipment and technology including electric trucks and charging equipment.	Funding program	Funds electric truck and charging at ports and key transit centers.
EPA Clean Heavy Duty Vehicles Program	$1 billion IRA program to replace heavy-duty commercial vehicles with zero-emissions vehicles, install charging	Funding program	Funds direct replacement of ICE HD vehicles with electric

	infrastructure, and develop and train the necessary workforce.		vehicles.
Alternative Fuel Vehicle Refueling Property Credit (30C)	IRA tax credit for charging stations in low-income and rural areas.	Tax incentive	Makes EV charging infrastructure construction more affordable in low-income and rural areas.
Qualified Commercial Vehicle Tax Credit (45W)	IRA tax credit of up to $40,000 for businesses and tax-exempt organizations to buy a qualified commercial clean vehicle.	Tax incentive	Makes purchasing electric vehicles more affordable for businesses and tax-exempt organizations.
Advanced Manufacturing Production Credit (45X)	IRA tax credit for domestic manufacturing of battery components, critical minerals, and other clean-energy components.	Tax incentive	Incentivizes the domestic production of battery components to develop a domestic EV manufacturing industry.
STATE			
	California Air Resource Board (CARB) set a phased ZEV MDV and		

California

In June 2020, California enacted the Advanced Clean Trucks (ACT) rule, which requires manufacturers to increase the percentage of zero-emissions medium-duty (MD) and heavy-duty (HD) trucks sold each year. Requirements start with model year 2025, and by 2030, 30 percent of manufacturers' truck sales must be zero-emissions. By 2050, 100 percent of truck sales are required to be electric. In July 2020, 15 states and the District of Columbia signed an agreement to follow California and enact ACT.

Below, we outline California's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition.

Trucking in California

California's trucking fleet mostly comprises medium- and heavy-duty trucks that travel short to medium distances, usually within the urban centers of San Francisco, Fresno, Bakersfield, Los Angeles, and San Diego. Of the 428,712 trucks in the state, 217,955 are heavy-duty vehicles, while 210,757 are medium-duty vehicles. The state's heavy-duty trucks travel an average of 182 miles per day, while its medium-duty trucks travel an average of 91 miles daily.

How Many of California's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **57 percent of California's trucks are electrifiable today. The state has 138,469 medium-duty and 105,874 heavy-duty electrifiable trucks, for a total of 244,343 electrifiable trucks.** These electric trucks would travel 601 million miles annually, accounting for 38 percent of the annual truck miles in the state.

57% of California's Trucks Are Electrifiable Today: Population Breakdown

How Much Energy Will California's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact California's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long 'owntimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

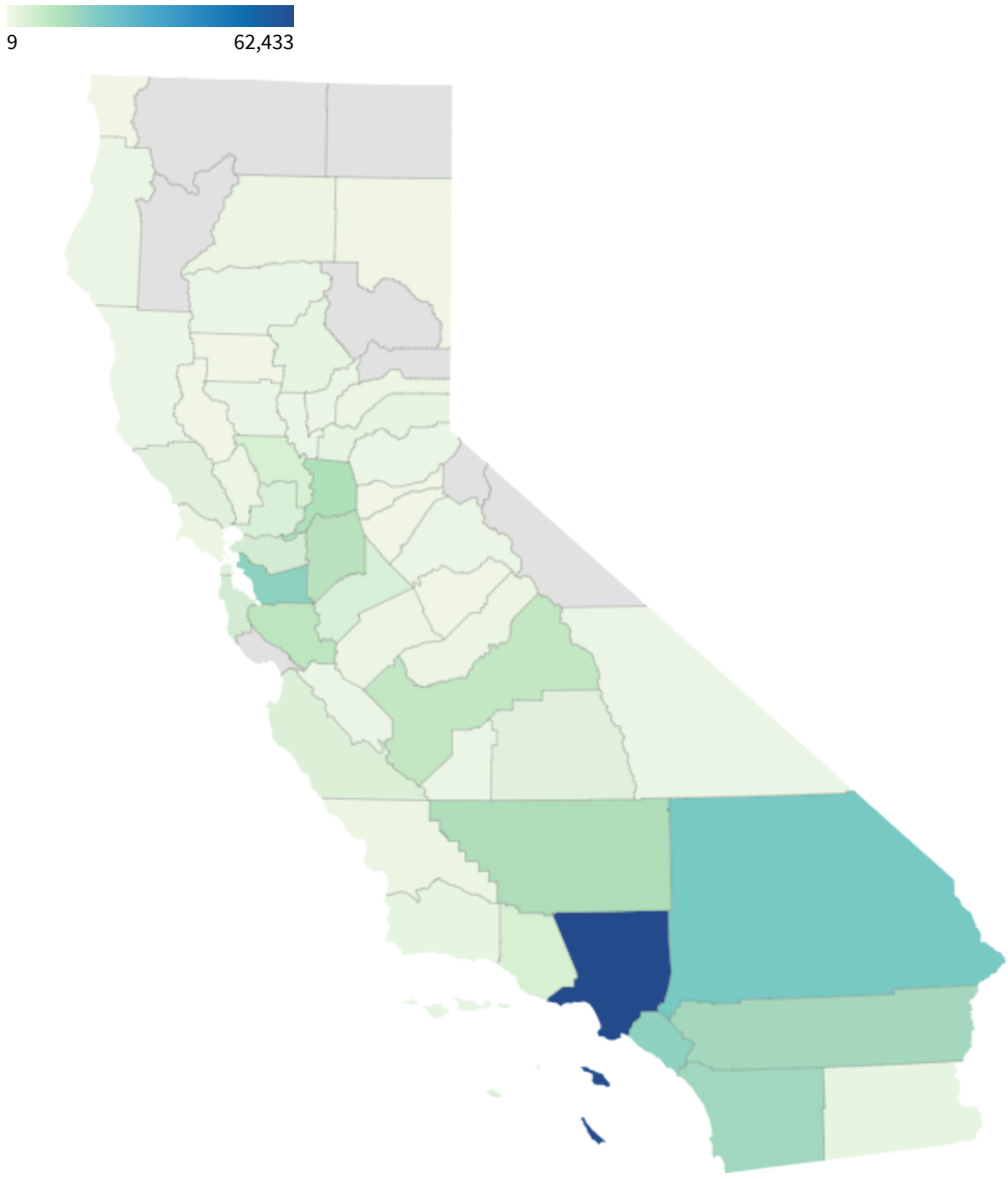
According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in California within the next three years would add a median annual energy demand of 12,462,774 MWh to the state's total electricity demand. This represents 6 percent of California's annual electricity retail sales. Electrifiable trucks would increase California's energy use by 4 percent and peak power use by 1 percent, if 75 percent of 4 p.m.–8 p.m. charging were shifted to overnight hours. Summer cooling loads in California are a significant power draw, so fleets may lower grid impacts by utilizing overnight charging opportunities. However, individual rate plans vary, and fleet operators should discuss optimal charging strategies with their electricity providers.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of California, it will particularly benefit the counties of **Sacramento, Alameda, Kern, Los Angeles, Orange, San Bernardino, Riverside, and San Diego, which can each electrify over 10,000 trucks**.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on California's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59

percent of ozone- and particle-forming nitrogen oxide (NO_x) emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 3,253 asthma cases and 227 air quality-associated mortalities annually in California. This will result in an associated $2.5 billion reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership (TCO) of electric short- and medium-haul trucks will be lower than the TCO of diesel trucks approximately five years sooner than would have been the case without the law.

Colorado

In July 2020, Colorado, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule

requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Colorado is already well on its way to transforming its trucking industry, having passed the Advanced Clean Trucks (ACT) legislation in 2023 to speed up the electrification of the trucking sector and get polluting internal combustion trucks off the road.

Trucking in Colorado

Transportation is the single largest source of greenhouse gas (GHG) emissions in Colorado, representing roughly 25 percent of the state's emissions. MHD vehicles like delivery trucks and tractor trailers contribute disproportionately to emissions: while they make up only 10 percent of vehicles on Colorado's roads, they produce nearly 25 percent of transportation-related GHG emissions.

Colorado's trucking fleet is mostly comprised of medium-duty (MD) trucks that travel short to medium distances, usually within urban centers. Of the 77,390 trucks in the state, 47,212 are MD vehicles, and 30,178 are heavy-duty (HD) vehicles. Trucking in Colorado is concentrated around urban corridors, especially in Adams County and Denver County. The state's HD trucks travel an average of 158 miles per day, while its MD trucks travel an average of 102 miles daily.

How Many of Colorado's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **57 percent of Colorado's trucks are electrifiable today. The state has 29,262 medium-duty and 15,075 heavy-duty electrifiable trucks, for a total of 44,338 electrifiable trucks.** These electric trucks would travel 144 million miles annually, accounting for 34 percent of the annual truck miles in the state. The counties of Denver and Adams, which together account for 51 percent of the state's trucks, have the highest concentration of electrifiable trucks in the state.

57% of Colorado's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	15,075	15,102
Medium-Duty Trucks	29,262	17,949

How Much Energy Will Colorado's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Colorado's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

Electrifying all the electrifiable trucks in Colorado within the next three years would add a median annual energy demand of 1,939,975 MWh to the state's total electricity demand, which represents a 3 percent increase over Colorado's current electricity generation.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Colorado, it will particularly **benefit the counties of Denver and Adams**. These counties have the highest population of medium- and heavy-duty trucks in the state, with 25,010 trucks in Adams County and 13,734 in Denver County. The two counties also have a particularly high proportion of electrifiable trucks, with roughly 56 percent of trucks in Adams County and 61 percent of trucks in Denver County being easily electrifiable.

Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Colorado's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 119 asthma cases and 8 air quality-associated mortalities annually in Colorado. This would result in an associated $86 million reduction in healthcare spending per year.**

he EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are key additions to ACT that provide market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA incentives, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Connecticut

In July 2020, Connecticut, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Connecticut's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Connecticut continues to work on finalizing the ACT rule, and in July 2023, Governor Ned Lamont and

the Connecticut Department of Energy and Environmental Protection took action to move ACT forward in the hopes of finalizing the rule by the end of the year.

Trucking in Connecticut

Transportation is the single largest source of greenhouse gas (GHG) emissions in Connecticut, representing roughly 25 percent of the state's emissions. Medium- and heavy-duty vehicles like delivery trucks and tractor trailers contribute disproportionately to emissions: while they make up only 6 percent of vehicles on Connecticut's roads, they produce nearly 25 percent of transportation-related GHG emissions.

Connecticut's trucking fleet mostly comprises medium-duty trucks that travel short to medium distances, usually within urban centers. Of the 51,231 trucks in the state, 31,392 are medium-duty vehicles, while 19,839 are heavy-duty vehicles. These trucks are concentrated around urban corridors, especially in Hartford County and New Haven County. The state's HD trucks travel an average of 186 miles per day, while its MD trucks travel an average of 112 miles daily.

How Many of Connecticut's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **50 percent of Connecticut's trucks are electrifiable today. The state has 17,294 medium-duty and 8,362 heavy-duty electrifiable trucks, for a total of 25,657 electrifiable trucks.** These electric trucks would travel 176 million miles annually, accounting for 33 percent of the annual truck miles in the state. The counties of Hartford and New Haven, which together account for 65 percent of the state's trucks, have the highest concentration of electrifiable trucks in the state.

50% of Connecticut's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	8,362	11,476
Medium-Duty	17.294	14.097

How Much Energy Will Connecticut's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Connecticut's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time. In Connecticut, where summer cooling loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities.

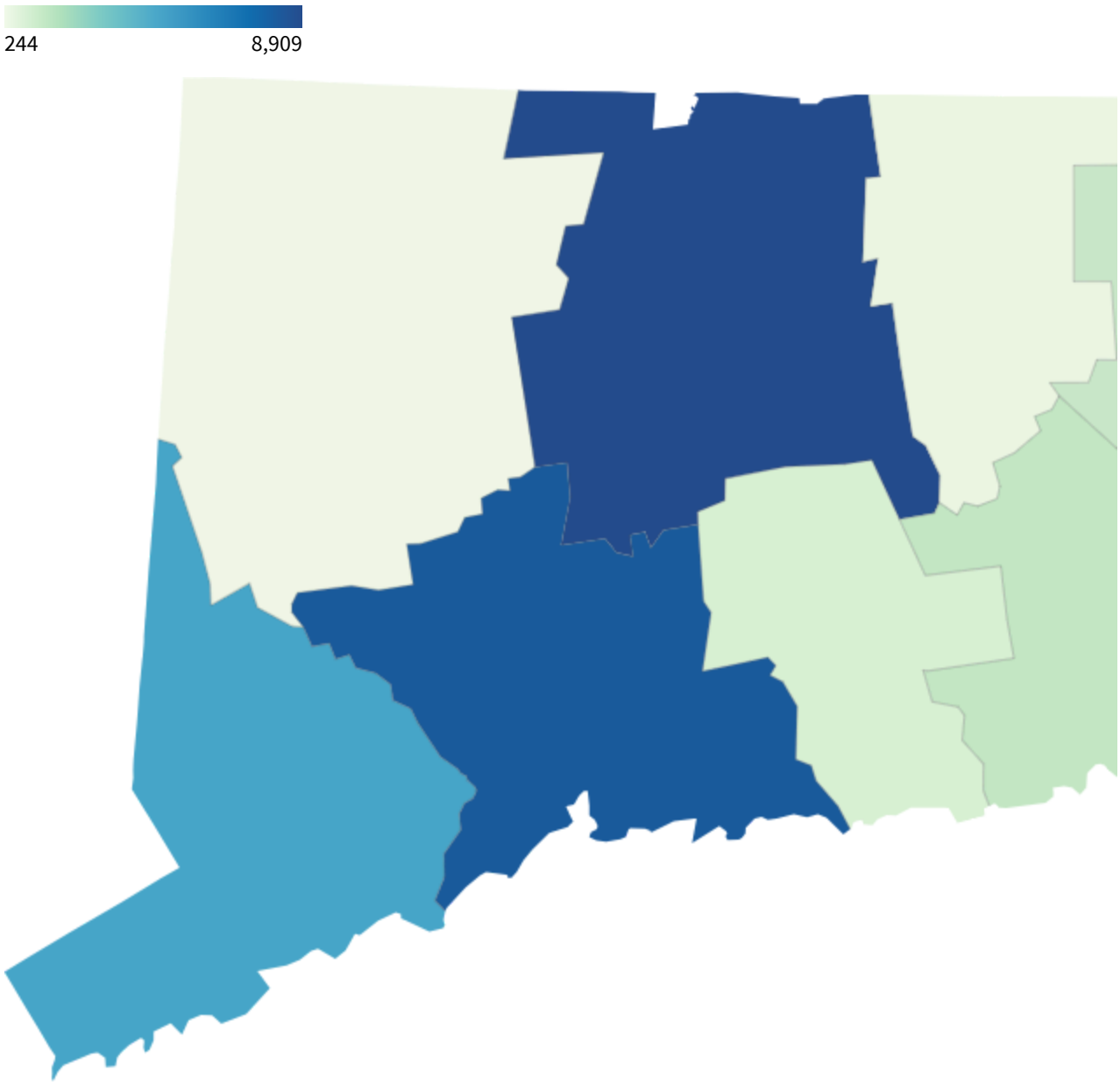
According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Connecticut within the next three years, would add a median annual energy demand of 1,388,904 MWh to the state's total electricity demand. This represents 3 percent of Connecticut's annual electricity retail sales. Electrifiable trucks would increase Connecticut's peak power use by 5 percent if 75 percent of charging that would happen between 4 p.m. and 8 p.m. were shifted to overnight hours. However, individual rate plans vary, and fleets should discuss optimal charging strategies with their electricity providers.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Connecticut, it will particularly **benefit the counties of Hartford and New Haven**. These counties have the highest population of medium- and heavy-duty trucks in the state, with 8,909 trucks in Hartford County and 8,055 in New Haven County. The two counties also have a particularly high proportion of electrifiable trucks, as roughly 47 percent of trucks in Hartford County and 54 percent of trucks in New Haven County are easily electrifiable.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Connecticut's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would**

help avoid nearly 109 asthma cases and 10 air quality-associated mortalities annually in Connecticut. This would result in an associated $114 million reduction in healthcare spending per year.

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Hawaii

In July 2020, Hawaii, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Hawaii's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Hawaii has not yet finalized ACT.

Trucking in Hawaii

Hawaii's trucking fleet mostly comprises medium-duty trucks that travel short distances. Of the 13,474 trucks in the state, 8,240 are medium-duty vehicles, while 5,234 are heavy-duty vehicles. These trucks are concentrated in Honolulu County. The state's HD trucks travel an average of 52 miles per day, while its MD trucks travel an average of 45 miles daily.

How Many of Hawaii's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **88 percent of Hawaii's trucks are electrifiable today. The state has 7,444 medium-duty and 4,354 heavy-duty electrifiable trucks, for a total of 11,799 electrifiable trucks.** These electric trucks would travel 83 million miles annually, accounting for 89 percent of the annual truck miles in the state.

88% of Hawaii's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	4,354	879
Medium-Duty Trucks	7,444	795

How Much Energy Will Hawaii's Electric Trucks Need?

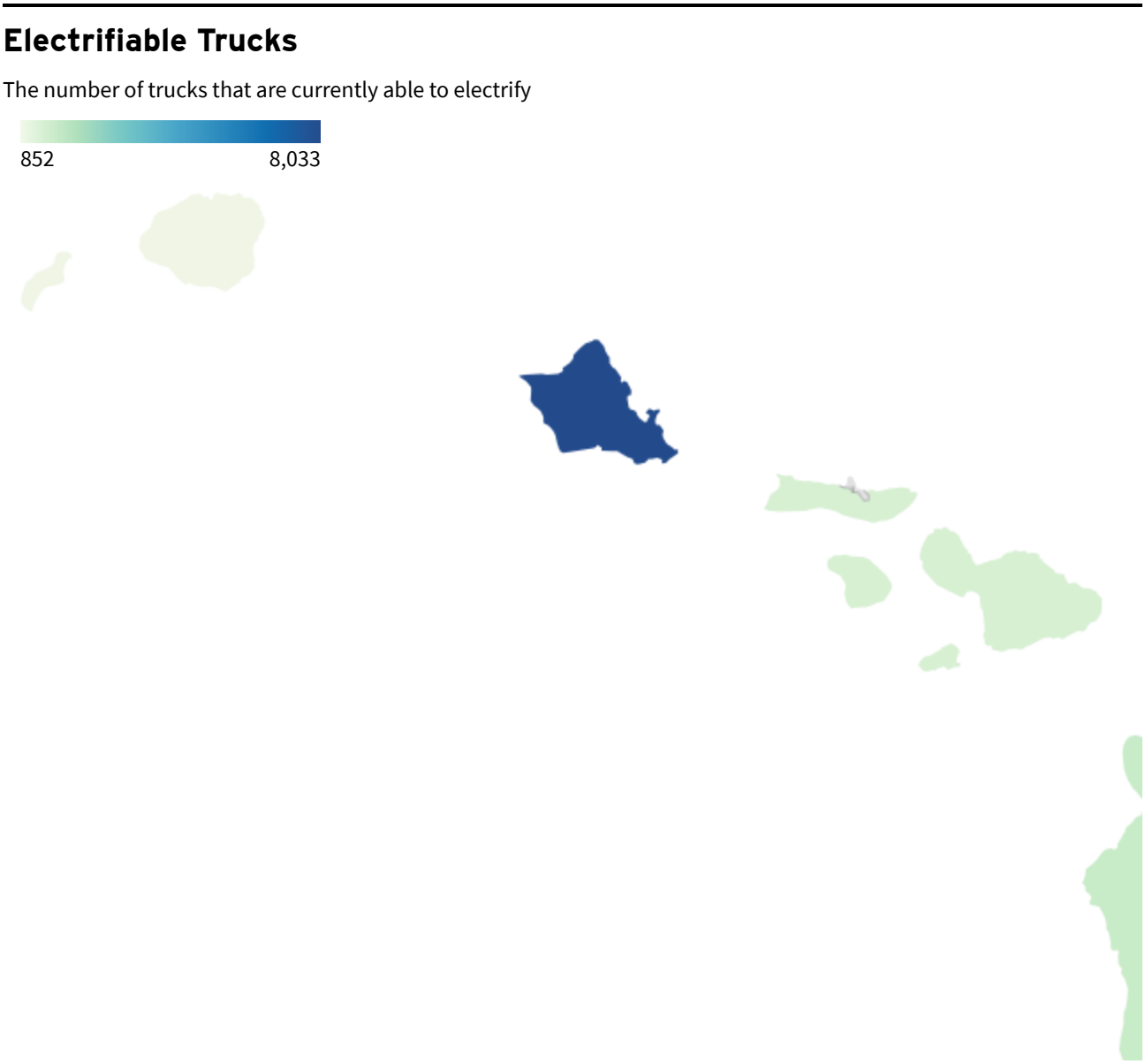
Replacing internal combustion engine trucks with electric vehicles will impact Hawaii's electric grid and require local grid upgrades. The load on the grid ·om electric trucks is determined by the intensity of the charging demand

and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Hawaii within the next three years would add a median annual energy demand of 322,946 MWh to the state's total electricity demand. This represents 4 percent of Hawaii's annual electricity retail sales.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Hawaii, it will particularly benefit **Honolulu County.** Honolulu County has the highest concentration of electrifiable trucks and the largest truck population in the state. Honolulu County can electrify 8,033 trucks today, which would account for 60 percent of the state's truck population.



The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of

electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Maine

In July 2020, Maine, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Maine's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Maine has not yet finalized ACT.

Trucking in Maine

Transportation is the single largest source of greenhouse gas (GHG) emissions in Maine, representing roughly 54 percent of the state's emissions. Medium- and heavy-duty trucks account for 27 percent of these transportation emissions.

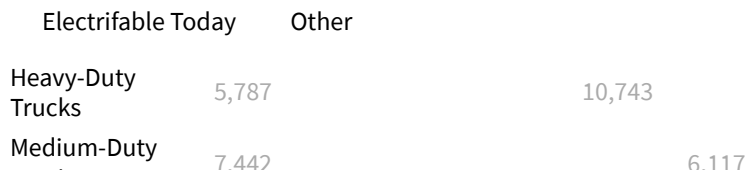
Maine's trucking fleet mostly comprises heavy-duty trucks that travel short to medium distances. Of the 30,091 trucks in the state, 13,560 are medium-duty vehicles, while 16,531 are heavy-duty vehicles. The state's HD trucks travel an average of 192 miles per day, while its MD trucks travel an average of 125 miles daily.

low Many of Maine's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **44 percent of Maine's trucks are electrifiable today. The state has 7,442 medium-duty and 5,787 heavy-duty electrifiable trucks, for a total of 13,320 electrifiable trucks.** These electric trucks would travel 74 million miles annually, accounting for 31 percent of the annual truck miles in the state.

44% of Maine's Trucks Are Electrifiable Today: Population Breakdown



How Much Energy Will Maine's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Maine's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Maine within the next three years would add a median annual energy demand of 1,006,028 MWh to the state's total electricity demand. This would represent 9 percent of Maine's annual electricity retail sales. Electrifiable trucks would increase Maine's energy use by 9 percent and peak power use by 14 percent if 75 percent of 4).m.–8 p.m. charging were shifted to overnight hours. However, winter heating loads are a significant power draw in Maine, so fleets may lower grid impacts

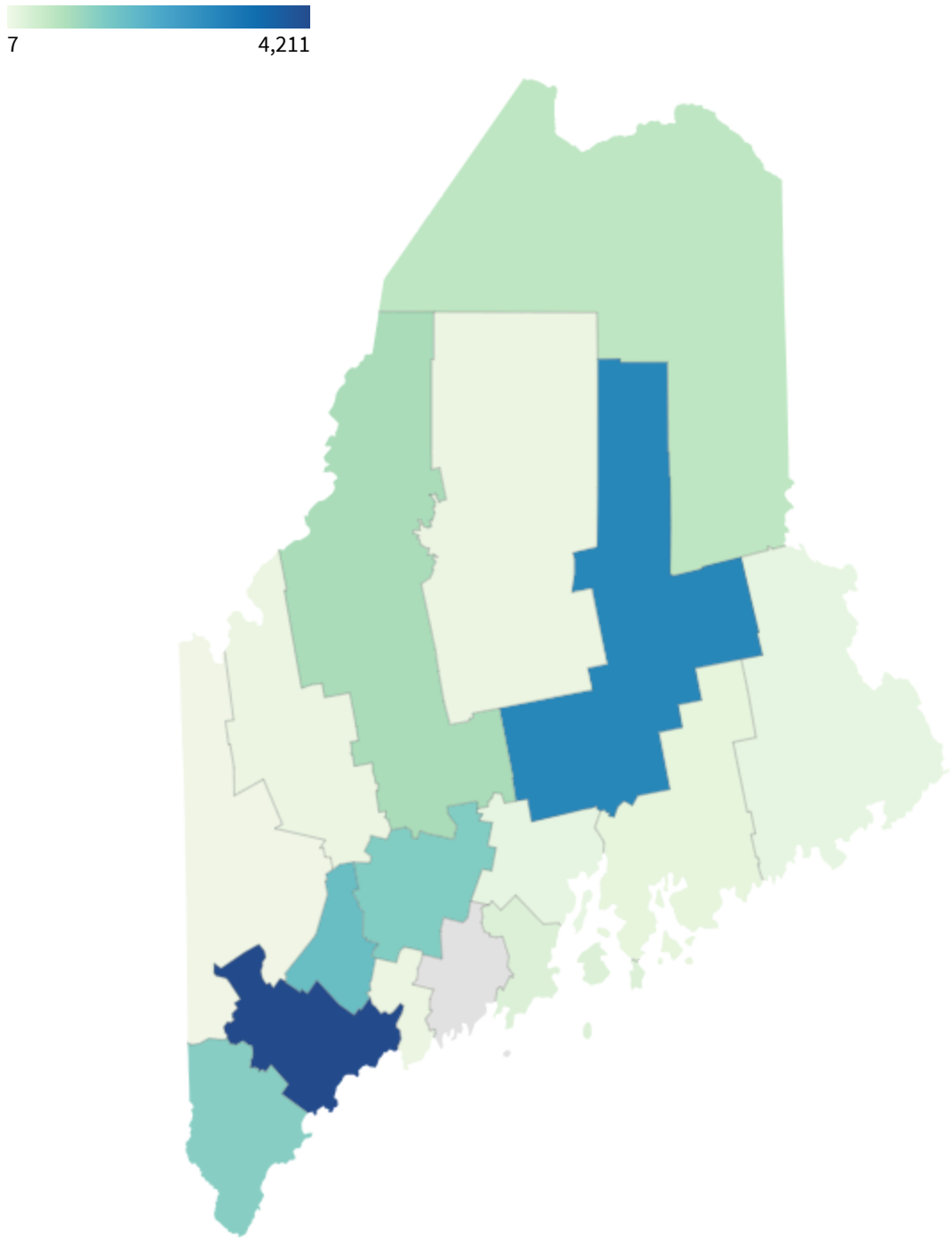
by utilizing daytime charging opportunities. Individual rate plans vary, and fleets should discuss optimal charging strategies with their electricity providers.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Maine, it will particularly benefit **the counties of Penobscot, Kennebec, Androscoggin, Cumberland, and York,** which have the highest concentration of electrifiable trucks in the state.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Maine's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of

ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 14 asthma cases and 2 air quality-associated mortalities annually in Maine. This would result in an associated $21 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Maryland

In July 2020, Maryland, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission ıedium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule

requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Maryland's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Maryland continues to work on finalizing the ACT rule with the passage of the Senate Clean Trucks Act of 2023, which directs the Department of the Environment to adopt ACT regulations by December 1, 2023.

Trucking in Maryland

Maryland's trucking fleet mostly comprises medium-duty (MD) trucks that travel short to medium distances, usually within urban centers. Of the 68,302 trucks in the state, 46,458 are MD vehicles, while 21,844 are heavy-duty (HD) vehicles. These trucks are concentrated around urban corridors, especially in the counties of Baltimore, Howard, and Prince George's. The state's HD trucks travel an average of 180 miles per day, while its MD trucks travel an average of 107 miles per day.

How Many of Maryland's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **54 percent of Maryland's trucks are electrifiable today. The state has 26,936 medium-duty and 9,728 heavy-duty electrifiable trucks, for a total of 36,665 electrifiable trucks.** These electric trucks would travel 129 million miles annually, accounting for 41 ercent of the annual truck miles in the state.

54% of Maryland's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	9,728	12,115
Medium-Duty Trucks	26,936	19,521

How Much Energy Will Maryland's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Maryland's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

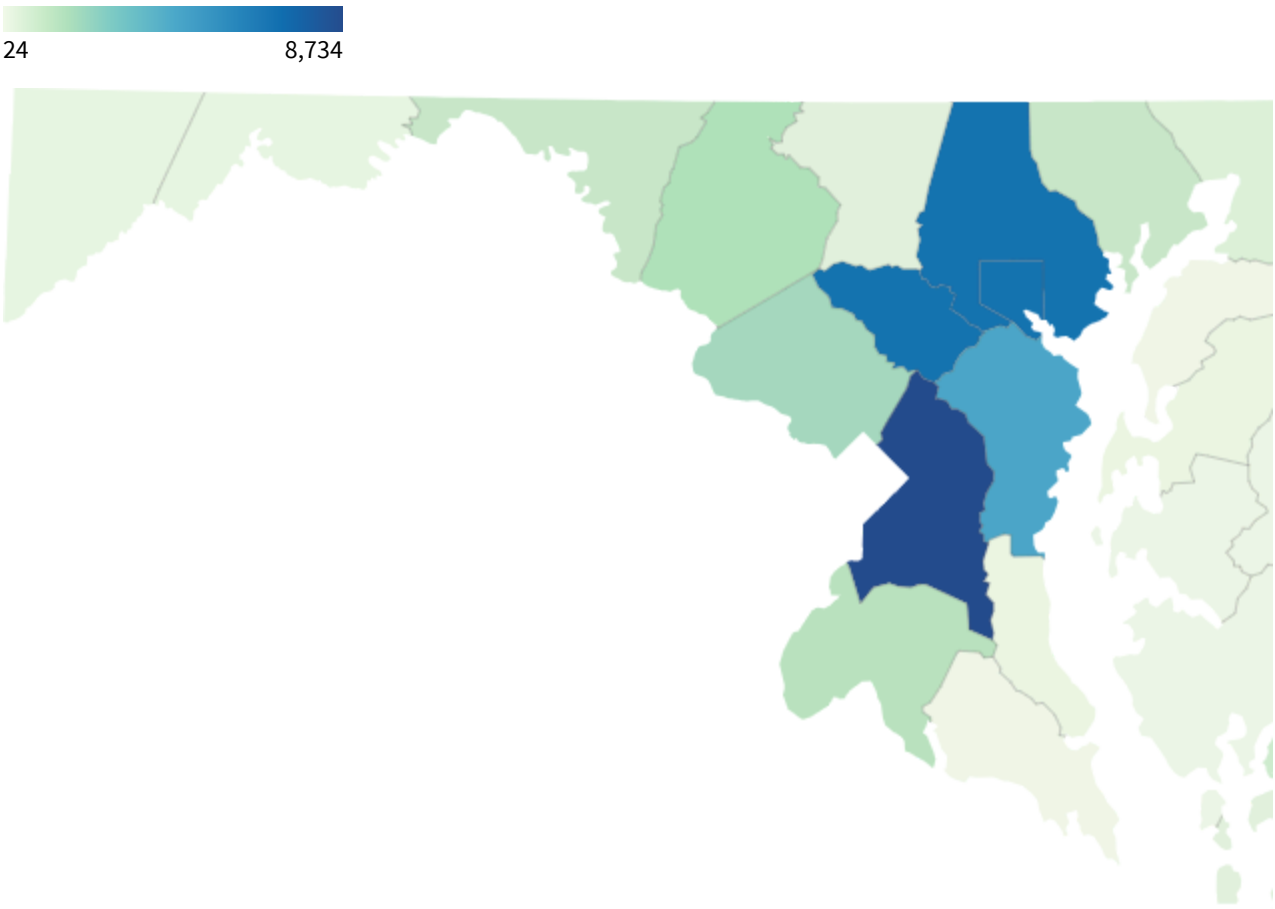
Electrifying all the electrifiable trucks in Maryland within the next three years would add a median annual energy demand of 1,961,663 MWh to the state's total electricity demand, which represents 3 percent of Maryland's current electricity generation.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Maryland, it will particularly **benefit the counties of Baltimore, Howard, and Prince George's**. These counties have the highest population of medium- and heavy-duty trucks in the state, accounting for 59 percent of the state's trucks. Over **half of the trucks in the counties of Baltimore, Howard, and Prince George's are electrifiable today, with 6,835 electrifiable trucks in Baltimore County, 6,825 in Howard County, and 8,734 in Prince George's County.**

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Maryland's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 171 asthma cases and 14 air quality-associated mortalities annually in Maryland. This would result in an associated $160 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas

Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Massachusetts

In July 2020, Massachusetts, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Massachusetts's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Massachusetts fully adopted ACT regulations in December 2022.

Trucking in Massachusetts

Transportation is the single largest source of greenhouse gas emissions in Massachusetts, representing roughly 37 percent of the state's emissions. Medium- and heavy-duty trucks account for 30 percent of these transportation emissions.

Massachusetts's trucking fleet mostly comprises medium-duty trucks that travel short to medium distances, usually within urban centers. Of the 99,221 trucks in the state, 61,728 are medium-duty vehicles, while 37,493 are heavy-duty vehicles. These trucks are concentrated in Worcester, Middlesex, Norfolk, and Bristol Counties. The state's heavy-duty trucks travel an average of 171 miles per day, while its medium-duty trucks travel an average of 106 miles daily.

How Many of Massachusetts's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **56 percent of Massachusetts's trucks are electrifiable today. The state has 37,714 medium-duty and 18,078 heavy-duty electrifiable trucks, for a total of 55,793 electrifiable trucks.** These electric trucks would travel 175 million miles annually, accounting for 39 percent of the annual truck miles in the state.

56% of Massachusetts's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	18,078	19,414
Medium-Duty	37.714	24.013

How Much Energy Will Massachusetts's Electric Trucks Need?

'eplacing internal combustion engine trucks with electric vehicles will impact Massachusetts's electric grid and require local grid upgrades. The load on the

grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time. In Massachusetts, where summer cooling loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities.

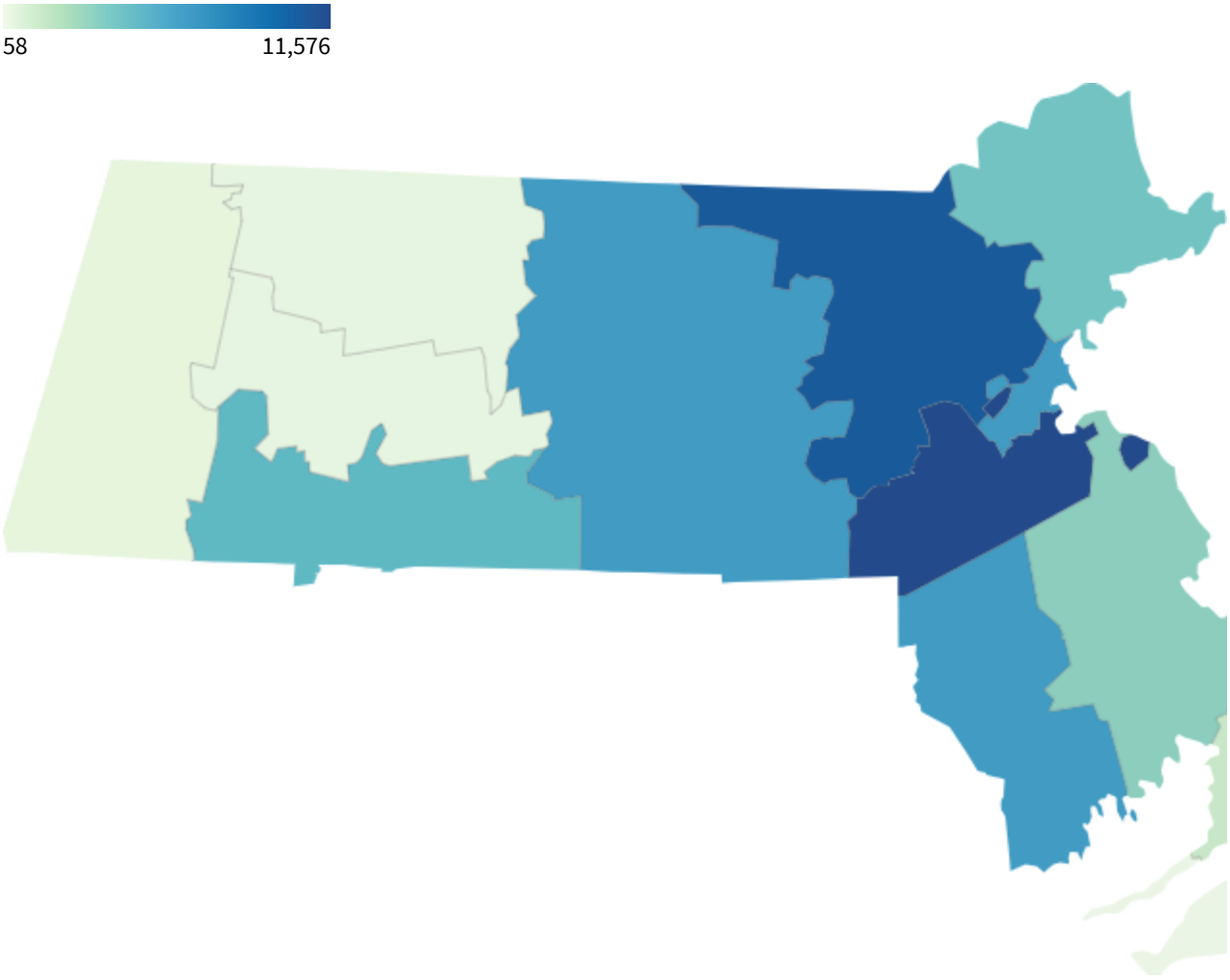
According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Massachusetts within the next three years would add a median annual energy demand of 3 million MWh to the state's total electricity demand. This represents 6 percent of Massachusetts's annual electricity retail sales.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Massachusetts, it will particularly benefit the counties of **Middlesex and Norfolk.** These two counties have the highest concentration of electrifiable trucks in the state, accounting for 71 percent of the state's trucks. Middlesex County and Norfolk County can electrify 10,437 and 11,576 trucks today, respectively.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Massachusetts's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 171 asthma cases and 17 air quality-associated mortalities annually in Massachusetts. This will result in an associated $188 million reduction in healthcare spending per year.**

he EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

New Jersey

In July 2020, New Jersey, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline New Jersey's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. New Jersey fully adopted ACT in April 2021.

Trucking in New Jersey

Transportation is the single largest source of greenhouse gas emissions in New Jersey, representing roughly 34 percent of the state's emissions. Medium- and heavy-duty trucks account for 20 percent of on-road transportation emissions in the state.

New Jersey's trucking fleet mostly comprises medium-duty trucks that travel short to medium distances, usually within urban centers. Of the 154,204 trucks in the state, 88,210 are medium-duty vehicles, while 65,994 are heavy-duty vehicles. These trucks are concentrated in the counties of Bergen, Union, Middlesex, Burlington, Camden, and Gloucester, around the urban centers of New York City and Philadelphia. The state's heavy-duty trucks travel an average of 183 miles per day, while its medium-duty trucks travel an average of 102 miles daily.

How Many of New Jersey's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **55 percent of New Jersey's trucks are electrifiable today. The state has 54,782 medium-duty and 29,971 heavy-duty electrifiable trucks, for a total of 84,753 electrifiable trucks.** These electric trucks would travel 183 million miles annually, accounting for 35 percent of the annual truck miles in the state.

55% of New Jersey's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	29,971	36,022
Medium-Duty	54.782	33.427

How Much Energy Will New Jersey's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact New Jersey's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time. In New Jersey, where summer cooling loads and winter heating loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities.

According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in New Jersey within the next three years would add a median annual energy demand of 4.7 million MWh to the state's total electricity demand. This represents 6 percent of New Jersey's annual electricity retail sales.

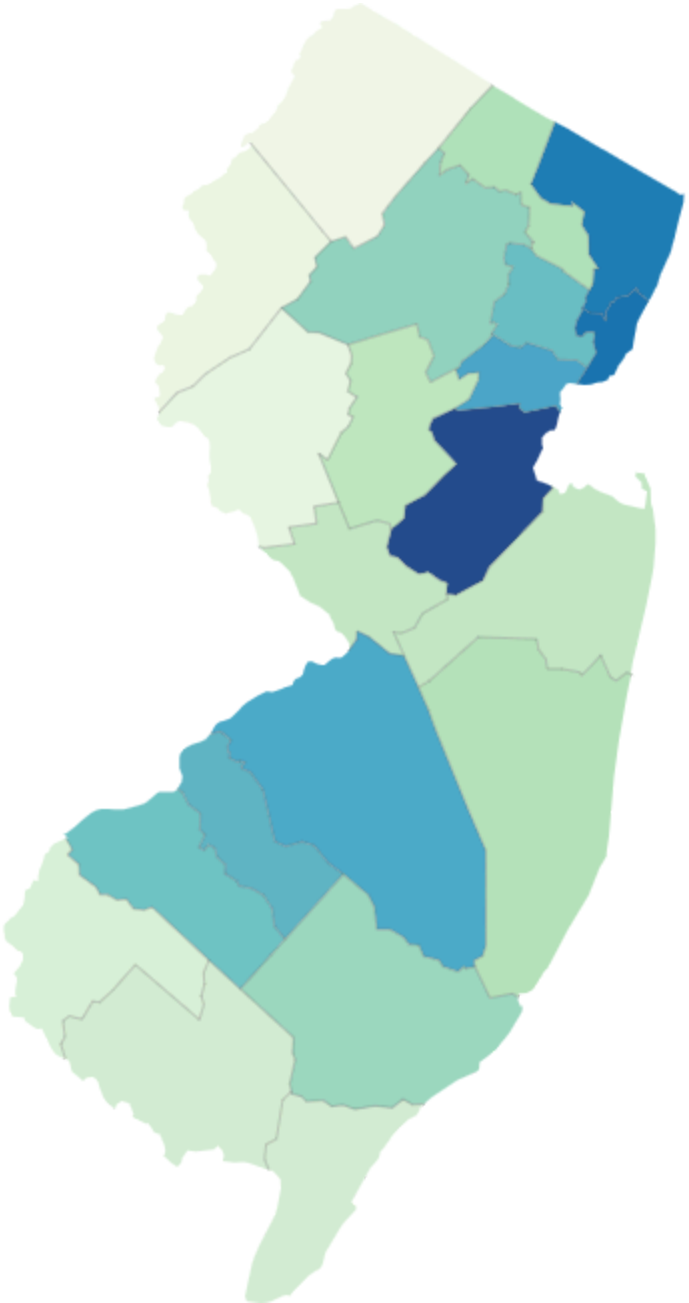
State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of New Jersey, it will particularly benefit **Middlesex County.** Middlesex County has the largest truck population in the state and has the highest concentration of electrifiable trucks in the state. Middlesex County can electrify 13,021 trucks today.

Electrifiable Trucks

The number of trucks that are currently able to electrify

334 13,021



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on New Jersey's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of

ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 457 asthma cases and 40 air quality–associated mortalities annually in New Jersey. This will result in an associated $446 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

New York

In July 2020, New York, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule

requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline New York's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. New York fully adopted ACT regulations in December 2021.

Trucking in New York

Transportation is the single largest source of greenhouse gas emissions in New York, and medium- and heavy-duty trucks account for 24 percent of these transportation emissions.

New York's trucking fleet mostly comprises medium-duty trucks that travel short to medium distances, usually within urban centers. Of the 257,174 trucks in the state, 145,186 are medium-duty vehicles, while 111,988 are heavy-duty vehicles. These trucks are concentrated in the counties of Erie, Monroe, Onondaga, Albany, Suffolk, Bronx, Queens, and Kings. The state's heavy-duty trucks travel an average of 161 miles per day, while its medium-duty trucks travel an average of 93 miles daily.

How Many of New York's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **57 percent of New York's trucks are electrifiable today. The state has 92,227 medium-duty and 53,293 heavy-duty electrifiable trucks, for a total of 145,521 electrifiable trucks.** These

electric trucks would travel 142 million miles annually, accounting for 34 percent of the annual truck miles in the state.

57% of New York's Trucks Are Electrifiable Today: Population Breakdown

How Much Energy Will New York's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact New York's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in New York within the next three years would add a median annual energy demand of 5.6 million MWh to the state's total electricity demand. This represents 4 percent of New York's annual electricity retail sales.

Electrifiable trucks would increase New York's grid-level energy use by an average of 4 percent and peak power use by an average of 2 percent if 75 percent of 4 p.m.–8 p.m. charging were shifted to overnight hours. Because summer cooling loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities. However, individual rate plans vary, and fleet operators should discuss optimal charging strategies with their electricity providers.

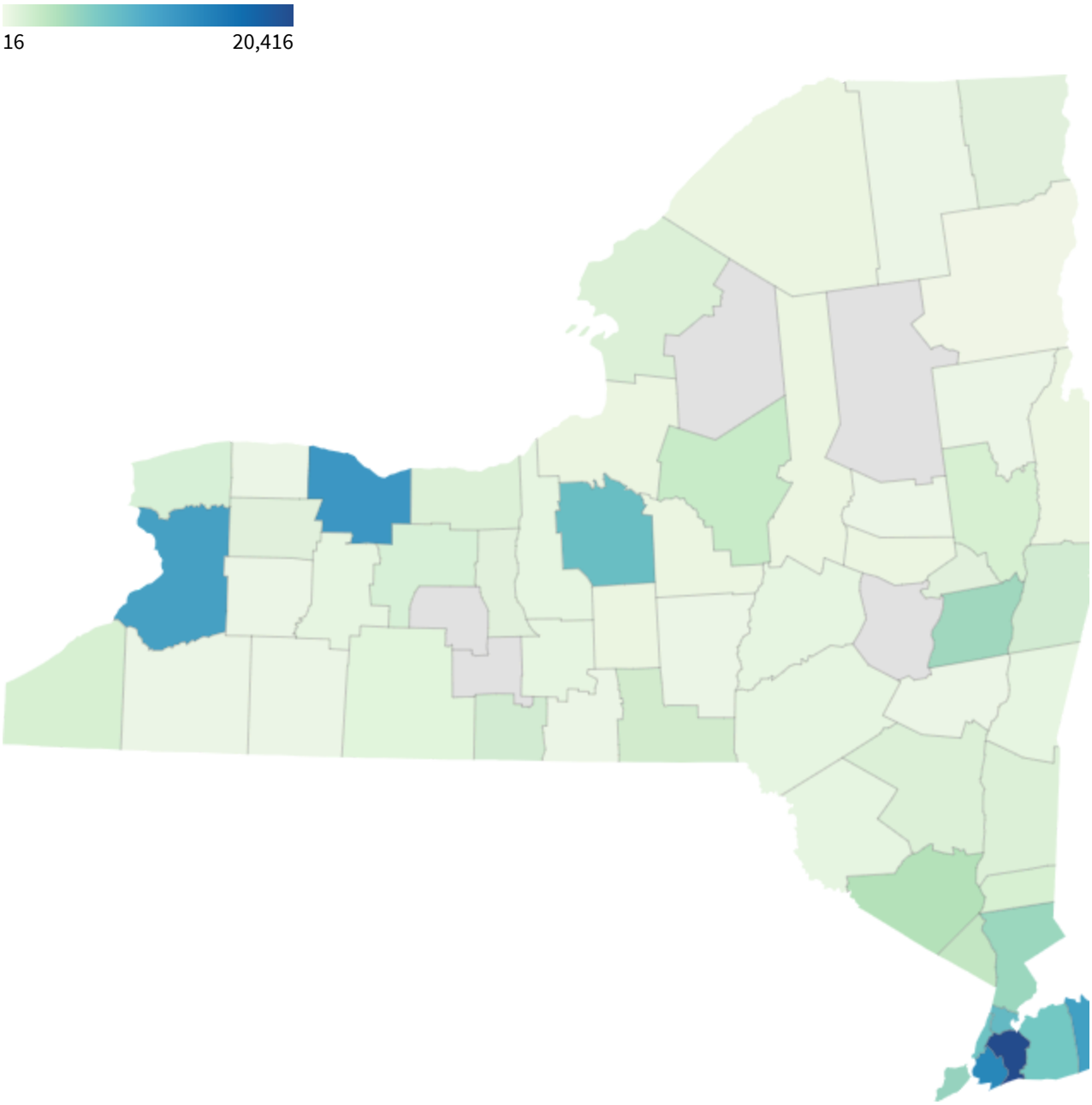
State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of New York, it will particularly benefit **the counties of Erie, Monroe, Suffolk, Queens, and Kings.** These five counties have the highest concentration of electrifiable trucks in the state, accounting for 42 percent of the state's trucks. Electric trucks are particularly compelling in the New York City counties of Kings and

Queens, where 72 percent and 70 percent, respectively, of trucks are electrifiable today.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on New York's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air

pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease.

New York's medium- and heavy-duty trucks create 45 percent of the particulate matter emitted by on-road vehicles. **Improvements in air quality from truck electrification would help avoid nearly 1,202 asthma cases and 92 air quality–associated mortalities annually in New York. This will result in an associated $1 billion reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

North Carolina

In July 2020, North Carolina, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission

medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline North Carolina's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. North Carolina has not yet finalized the ACT rule.

Trucking in North Carolina

Transportation is the single largest source of greenhouse gas (GHG) emissions in North Carolina, representing roughly 35 percent of the state's emissions. Medium- and heavy-duty vehicles like delivery trucks and tractor trailers contribute disproportionately to emissions and pollution: while they make up only 3 percent of registered vehicles, they emit 26 percent of smog-forming nitrogen oxide and 32 percent of particulate matter in the state.

North Carolina's trucking fleet mostly comprises heavy-duty trucks that travel short to medium distances. Of the 195,292 trucks in the state, 116,231 are heavy-duty vehicles, while 79,061 are medium-duty vehicles. These trucks are concentrated around the urban corridors of Raleigh, Greensboro, and Charlotte in the counties of Wake, Guilford, and Mecklenburg. The state's HD trucks travel an average of 190 miles per day, while its MD trucks travel an average of 121 miles daily.

How Many of North Carolina's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **41 percent of North Carolina's trucks are electrifiable today. The state has 38,952 medium-duty and 40,795 heavy-duty electrifiable trucks, for a total of 79,748 electrifiable trucks.** These electric trucks would travel 144 million miles annually, accounting for 26 percent of the annual truck miles in the state.

41% of North Carolina's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	40,795	75,435
Medium-Duty	38.952	40.108

How Much Energy Will North Carolina's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact North Carolina's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time. In North Carolina, where summer cooling loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities.

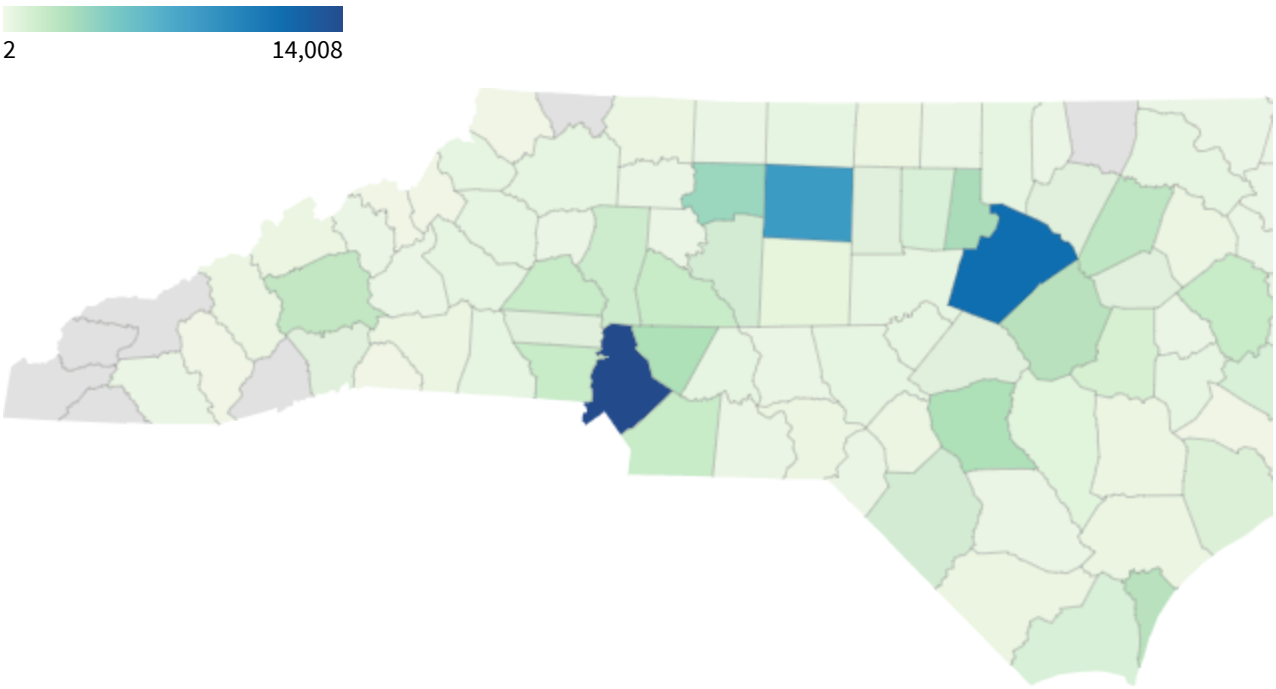
According to RMI's analysis using data from the US. Energy Information Administration, electrifying all the electrifiable trucks in North Carolina within the next three years would add a median annual energy demand of 5,221,625 MWh to the state's total electricity demand. This represents 4 percent of North Carolina's annual electricity retail sales.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of North Carolina, it will particularly **benefit the counties of Wake and Mecklenburg**. These counties have the highest population of electrifiable trucks in the state, with 14,008 electrifiable trucks in Mecklenburg County and 11,331 electrifiable trucks in Wake County.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on North Carolina's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 139 asthma cases and 11 air quality-associated mortalities annually in North Carolina. This will result in an associated $124 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Oregon

In July 2020, Oregon, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Oregon's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Oregon fully enacted ACT in November 2021.

Trucking in Oregon

Oregon's trucking fleet mostly comprises a fairly even split of medium- and heavy-duty trucks that travel short to medium distances, usually within urban centers. Of the 67,949 trucks in the state, 34,156 are medium-duty vehicles, while 33,793 are heavy-duty vehicles. These trucks are concentrated around the urban corridor of Portland, Salem, and Eugene, especially in the counties of Multnomah, Washington, Clackamas, Marion, and Lane. The state's heavy-

duty trucks travel an average of 195 miles per day, while its medium-duty trucks travel an average of 103 miles daily.

How Many of Oregon's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **45 percent of Oregon's trucks are electrifiable today. The state has 19,003 medium-duty and 11,262 heavy-duty electrifiable trucks, for a total of 30,265 electrifiable trucks.** These electric trucks would travel 147 million miles annually, accounting for 23 percent of the annual truck miles in the state.

45% of Oregon's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	11,262	22,530
Medium-Duty Trucks	19,003	15,152

How Much Energy Will Oregon's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Oregon's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Oregon within the next three years would add a median annual energy demand of 1.5 million

MWh to the state's total electricity demand. This represents 3 percent of Oregon's annual electricity retail sales.

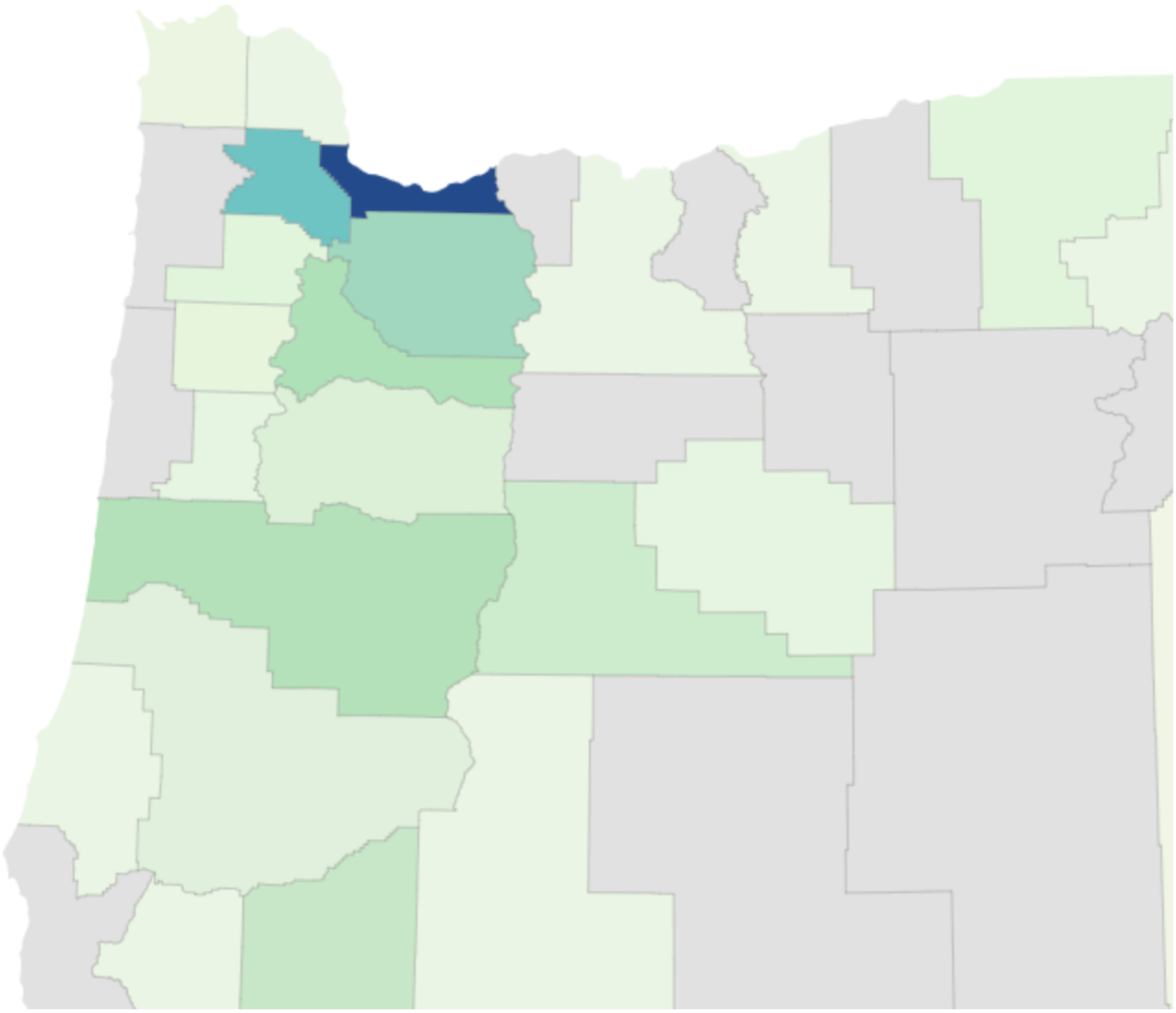
State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Oregon, it will particularly benefit **Multnomah County.** In Multnomah, 44 percent of trucks can be easily electrified, which would add up to 12,475 electric trucks.

Electrifiable Trucks

The number of trucks that are currently able to electrify

17 12,475



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Oregon's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of

ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 32 asthma cases and three air quality-associated mortalities annually in Oregon. This will result in an associated $31 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Pennsylvania

In July 2020, Pennsylvania, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule

requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Pennsylvania's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Pennsylvania has yet to fully enact ACT.

Trucking in Pennsylvania

Pennsylvania's trucking fleet comprises medium- and heavy-duty trucks that travel short to medium distances. Of the 330,165 trucks in the state, 172,686 are heavy-duty vehicles, while 157,479 are medium-duty vehicles. These trucks are concentrated around the urban corridors of Pittsburgh, Philadelphia, Lancaster, Reading, Allentown, and Harrisburg. The state's heavy-duty trucks travel an average of 184 miles per day, while its medium-duty trucks travel an average of 105 miles daily.

How Many of Pennsylvania's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **43 percent of Pennsylvania's trucks are electrifiable today. The state has 82,934 medium-duty and 58,941 heavy-duty electrifiable trucks, for a total of 141,875 electrifiable trucks.** These electric trucks would travel 153 million miles annually, accounting for 31 percent of the annual truck miles in the state.

43% of Pennsylvania's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	58,941	113,744
Medium-Duty	82.934.49	74.544

How Much Energy Will Pennsylvania's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Pennsylvania's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time. In Pennsylvania, where summer cooling and winter heating loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities.

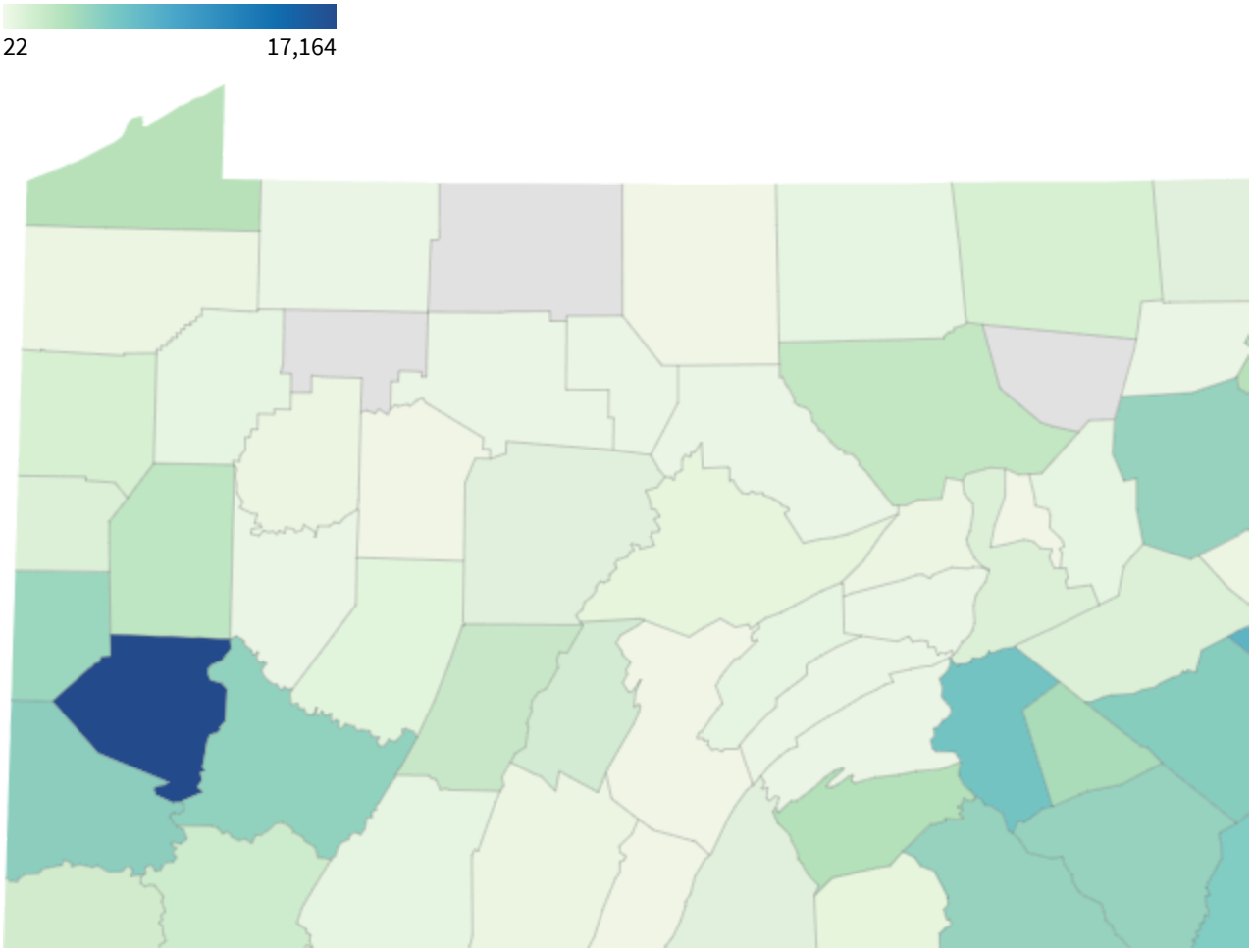
According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Pennsylvania within the next three years would add a median annual energy demand of 7,928,923 MWh to the state's total electricity demand. This represents 6 percent of Pennsylvania's annual electricity retail sales.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Pennsylvania, it will particularly **benefit the counties of Montgomery, Philadelphia, and Allegheny.** These counties have the highest population of electrifiable trucks in the state and can electrify over half of their trucks. Montgomery County, Philadelphia County, and Allegheny County can electrify 10,702, 11,588, and 17,164 trucks, respectively.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Pennsylvania's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide (NO_x) emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 356 asthma cases and 39 air quality-associated mortalities annually in Pennsylvania. This will result in an associated $426 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership (TCO) of electric short- and medium-haul trucks will be lower than the TCO of diesel trucks approximately five years sooner than would have been the case without the law.

Rhode Island

In July 2020, Rhode Island, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Rhode Island's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Rhode Island continues to work on finalizing the ACT with a proposed rule for the Rhode Island

Department of Environmental Management, which held a public listening session in May 2023.

Trucking in Rhode Island

Transportation is the single largest source of greenhouse gas (GHG) emissions in Rhode Island, representing roughly 39 percent of the state's emissions. Rhode Island's trucking fleet mostly comprises medium-duty trucks that travel short to medium distances, usually within the Providence and Warwick urban centers. Of the 13,865 trucks in the state, 8,178 are medium-duty vehicles, while 5,687 are heavy-duty vehicles. These trucks are concentrated in the counties of Providence and Kent. The state's HD trucks travel an average of 188 miles per day, while its MD trucks travel an average of 106 miles daily.

How Many of Rhode Island's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **60 percent of Rhode Island's trucks are electrifiable today. The state has 5,681 medium-duty and 2,579 heavy-duty electrifiable trucks, for a total of 8,261 electrifiable trucks.** These electric trucks would travel 128 million miles annually, accounting for 40 percent of the annual truck miles in the state.

60% of Rhode Island's Trucks Are Electrifiable Today: Population Breakdown

Heavy-Duty Trucks	2,579	3,107	
Medium-Duty	5.681		2.496.64

How Much Energy Will Rhode Island's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact hode Island's electric grid and require local grid upgrades. The load on the

grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

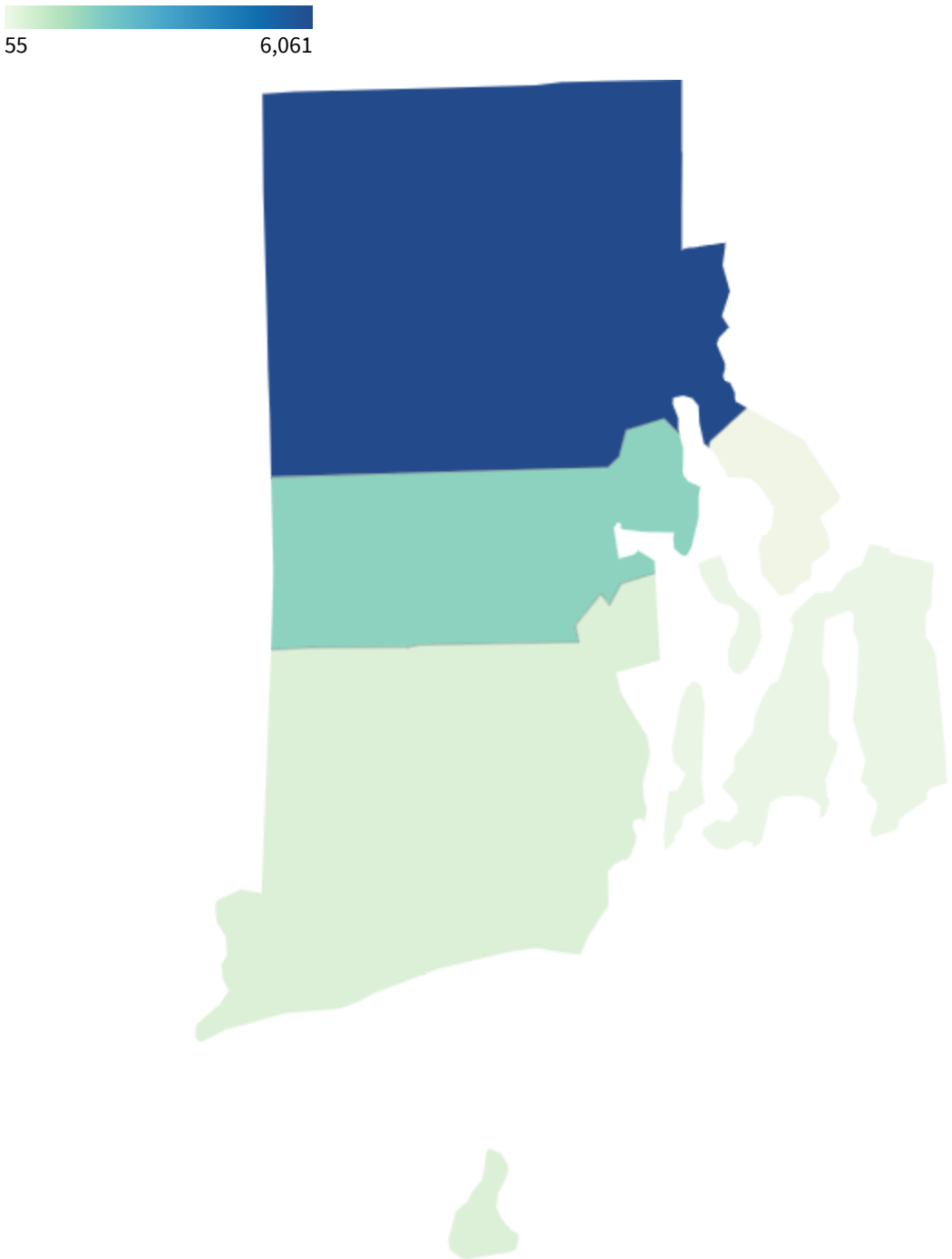
According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Rhode Island within the next three years would add a median annual energy demand of 498,667 MWh to the state's total electricity demand. This represents 7 percent of Rhode Island's annual electricity retail sales. Electrifiable trucks can increase Rhode Island's energy use by 6 percent and peak power use by 6 percent if 75 percent of 4 p.m.–8 p.m. charging is shifted to overnight hours. Because summer cooling loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities. However, individual rate plans vary, and fleets should discuss optimal charging strategies with their electricity providers.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Rhode Island, it will particularly benefit the counties of **Providence and Kent.** These two counties have the highest concentration of electrifiable trucks in the state, and their truck population accounts for 93 percent of the state's trucks. Providence County and Kent County can electrify 6,061 and 1,676 trucks today, respectively.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Rhode Island's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59

percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 34 asthma cases and 4 air quality–associated mortalities annually in Rhode Island. This will result in an associated $41 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership of electric short- and medium-haul trucks will be lower than the total cost of ownership of diesel trucks approximately five years sooner than would have been the case without the law.

Vermont

In July 2020, Vermont, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission medium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule

requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Vermont's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. Vermont fully adopted ACT regulations in November 2022.

Trucking in Vermont

Vermont's trucking fleet comprises a fairly even split of medium- and heavy-duty trucks that travel short to medium distances. Of the 13,986 trucks in the state, 7,005 are heavy-duty vehicles, while 6,981 are medium-duty vehicles. These trucks are concentrated in Chittenden County surrounding the urban center of Burlington. The state's heavy-duty trucks travel an average of 165 miles per day, while its medium-duty trucks travel an average of 124 miles daily.

How Many of Vermont's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **51 percent of Vermont's trucks are electrifiable today. The state has 3,508 medium-duty and 3,692 heavy-duty electrifiable trucks, for a total of 7,200 electrifiable trucks.** These electric trucks would travel 75 million miles annually, accounting for 43 percent of the annual truck miles in the state.

51% of Vermont's Trucks Are Electrifiable Today: Population Breakdown

	Electrifable Today	Other
Heavy-Duty Trucks	3,692	3,312
Medium-Duty Trucks	3,508	3,472

How Much Energy Will Vermont's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Vermont's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Vermont within the next three years would add a median annual energy demand of 563,685 MWh to the state's total electricity demand. This represents 10 percent of Vermont's annual electricity retail sales.

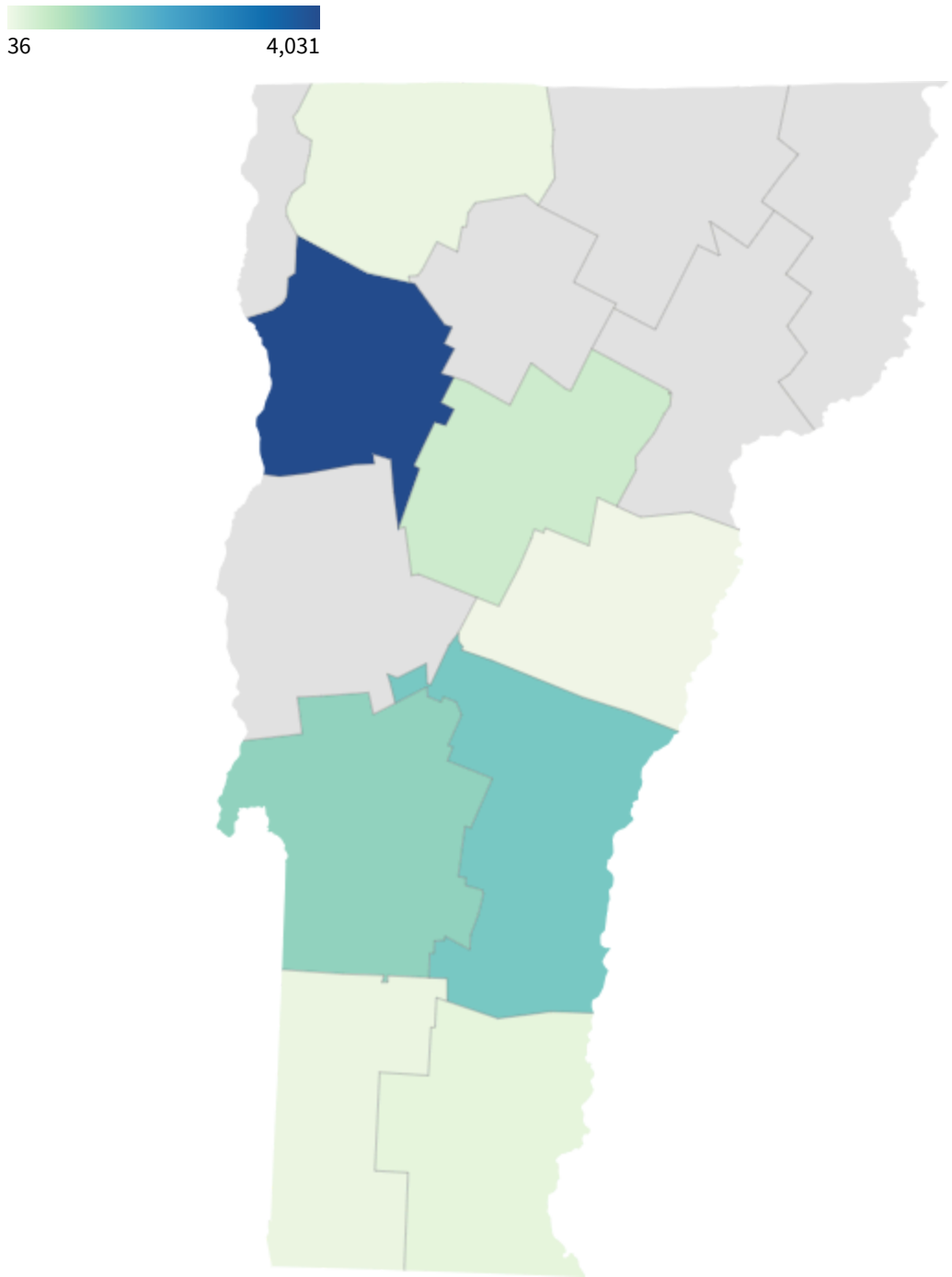
Electrifiable trucks would increase Vermont's energy use by 11 percent and peak power use by 4 percent if 75 percent of 4 p.m.–8 p.m. charging were shifted to overnight hours. Because summer cooling loads are a significant power draw, fleets may lower grid impacts by utilizing overnight charging opportunities. However, individual rate plans vary, and fleet operators should discuss optimal charging strategies with their electricity providers.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Vermont, it will particularly benefit **Chittenden County,** which is home to 40 percent of the state's truck population. Today 54 percent of Chittenden's trucks can be electrified, for a total of 4,031 electrifiable trucks.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Vermont's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of

ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid 10 asthma cases and 60 air quality–associated mortalities over the next 10 years in Vermont. This will result in an associated $7.9 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership (TCO) of electric short- and medium-haul trucks will be lower than the TCO of diesel trucks approximately five years sooner than would have been the case without the law.

Washington

In July 2020, Washington, along with 14 other states and the District of Columbia, signed a Memorandum of Understanding stating their intention to enact California's Advanced Clean Trucks (ACT) rule. ACT requires manufacturers to progressively increase the proportion of zero-emission ıedium-duty (MD) and heavy-duty (HD) trucks sold each year. The rule

requires 30 percent of manufacturers' truck sales to be zero-emissions by 2030 and 100 percent by 2050. In July 2022, 17 states, the District of Columbia, and the Province of Quebec created the Multi-State Zero Emissions Vehicle Action Plan to accelerate the transition to zero-emission trucks and buses.

Below, we outline Washington's trucking industry, how many of its trucks are electrifiable, the future charging needs of these trucks, and the available funding that fleets can use to make the transition. In 2021 Washington fully adopted Advanced Clean Trucks regulations.

Trucking in Washington

Washington's trucking fleet mostly comprises medium-duty trucks that travel short to medium distances, usually within urban centers. Of the 104,193 trucks in the state, 56,258 are medium-duty vehicles, while 47,935 are heavy-duty vehicles. These trucks are concentrated around urban corridors, especially those of Spokane, Seattle, and Olympia. The state's heavy-duty trucks travel an average of 180 miles per day, while its medium-duty trucks travel an average of 97 miles daily.

How Many of Washington's Trucks Can Be Electrified Today?

Many electric trucks have a maximum range of around 300 miles before they need recharging. The most "electrifiable" trucks are those that return to their depot after fewer than 300 miles traveled in 95 percent of use cases. These trucks can be electrified today with current technology and charging infrastructure. However, it is worth noting that vehicle range, fleet management, and public charging infrastructure are all improving rapidly, and it is likely that the number of easily electrifiable trucks will increase in the coming years.

RMI analysis found that **52 percent of Washington's trucks are electrifiable today. The state has 32,876 medium-duty and 20,936 heavy-duty electrifiable trucks, for a total of 53,812 electrifiable trucks.** These electric trucks would travel 203 million miles annually, accounting for 39 percent of the annual truck miles in the state.

52% of Washington's Trucks Are Electrifiable Today: Population Breakdown

How Much Energy Will Washington's Electric Trucks Need?

Replacing internal combustion engine trucks with electric vehicles will impact Washington's electric grid and require local grid upgrades. The load on the grid from electric trucks is determined by the intensity of the charging demand and the time of day. Charging at lower power over long hours reduces the strain on the electric grid. Many short- and medium-haul trucks have long downtimes of up to 16 hours a day, which means that they can use less powerful chargers to charge for as long as 8 hours at a time.

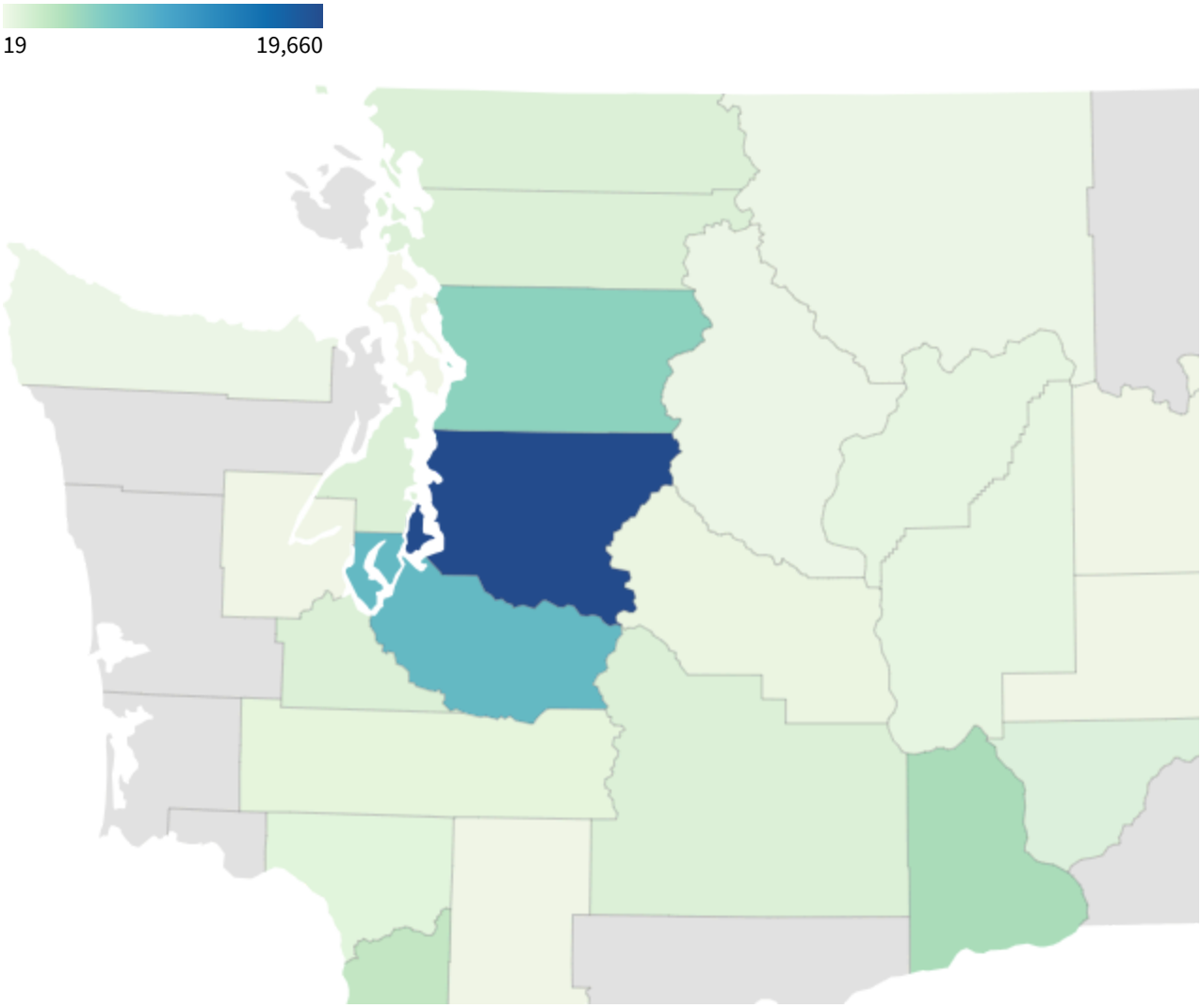
According to RMI's analysis using data from the US Energy Information Administration, electrifying all the electrifiable trucks in Washington within the next three years, would add a median annual energy demand of 6,495,892 MWh to the state's total electricity demand. This represents 7 percent of Washington's annual electricity retail sales.

State Wins, Local Benefits

While trucking electrification will be a boon to the entire state of Washington, it will particularly **benefit the counties of Snohomish, King, and Pierce**. These counties have the highest concentration of easily electrified trucks in the state, with Snohomish, King, and Pierce able to electrify 5,333 trucks, 19,660 trucks, and 7,961 trucks, respectively.

Electrifiable Trucks

The number of trucks that are currently able to electrify



Public Health Impacts

Transitioning to electric trucks would also have a tremendous impact on Washington's air quality and public health. According to a study by the American Lung Association, medium- and heavy-duty trucks generate 59 percent of ozone- and particle-forming nitrogen oxide emissions and 55 percent of particle pollution while accounting for only 6 percent of the road fleet. This air pollution can harm children and adults, with exposure to traffic pollution linked to lung cancer, respiratory problems, asthma, and ischemic heart disease. **Improvements in air quality from truck electrification would help avoid nearly 132 asthma cases and 10 air quality-associated mortalities annually in Washington. This will result in an associated $115 million reduction in healthcare spending per year.**

The EV Market Is Moving

Electric trucks are becoming increasingly affordable due to market and policy advancements. The Environmental Protection Agency's Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3 and Advanced Clean Fleets policies are two key additions to ACT that are moving forward. They will provide additional market certainty and help ensure that fleet operators have a wide variety of electric models to choose from.

In 2022, the Inflation Reduction Act (IRA) created the Qualified Commercial Vehicle Credit, which provides a tax credit of up to $40,000 for the purchase of electric trucks, and the Alternative Fuel Refueling Infrastructure Credit, which makes up to $100,000 available for sites that install EV charging infrastructure. These significant tax credits have shifted the economics of electric trucks and, in many use cases, make owning an electric truck cheaper than owning a diesel one. Thanks to the IRA, the total cost of ownership (TCO) of electric short- and medium-haul trucks will be lower than the TCO of diesel trucks approximately five years sooner than would have been the case without the law.