Clean Fuels Master Plan

NORTH FLORIDA TPO

NORTH FLORIDA CLEAN FUELS

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1 Summary

Embracing clean transportation fuels can address environmental challenges, promote economic growth, and ensure energy resilience. The North Florida Clean Fuels Coalition (CFC), a project of the North Florida Transportation Planning Organization (TPO), has demonstrated a commitment to these aims by implementing the Alternative Fuels, Vehicles and Infrastructure Master Plan beginning in 2014, outlining strategies to enhance clean fuel use throughout Baker, Clay, Duval, Nassau, Putnam and St. Johns counties. Since then, the North Florida TPO and CFC have invested over $6 million in alternative fuel vehicles and infrastructure, and the region's clean fuel use has surged. From 2016 to 2022, clean fuel use has grown 276%, while clean fuels vehicle registrations have grown 413%, making the region a national leader in per capita clean fuels use.

Forecasts anticipate a decline in petroleum consumption from 2022 to 2050, aligning with broader initiatives to reduce the transportation sector's environmental impact and emphasize a healthier, more equitable energy future. Federal actions, such as the passage of the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA), are spurring investment in clean energy infrastructure. Executive Order 14008 directs 40% of this investment to underinvested communities affected by pollution and environmental hazards.

Clean fuels include biofuels, electricity, propane, natural gas and hydrogen. Each has potential to cost-effectively create a more sustainable transportation system. Realizing this potential entails matching their unique advantages to fleets' specific needs. Hence the North Florida CFC is "fuel neutral," advocating the right fuel for the right application. Consistent with this approach, the updated Clean Fuels Master Plan builds on past achievements and leverages local and national momentum to drive the next 10 years of clean fuels investment.

The goals and strategies included in this plan were developed using data collected from over a dozen public fleets, representing over 8,000 vehicles and 100 million gallons of gas and diesel consumption. It evaluated nearly 800 scenarios to identify 100 opportunities for fleets to cost-effectively transition to clean fuels. These opportunities have potential to displace more than 10 million gallons of gas and diesel use, saving fleets money, while reducing their impact on human health and the environment. Additional policy recommendations are included to support implementation efforts.

The plan's structure is designed for enhancement. It will evaluate data from additional fleets as it becomes available and identify more opportunities for action. The region's fleet are encouraged to participate in this ongoing process. Moving forward, the North Florida CFC will center its efforts on the goals and strategies included in this plan now and in the future, aiming to continuously develop the region as a leader advancing clean fuels, vehicles and infrastructure.

2 Overview

The North Florida TPO plays a crucial role in leading planning, funding and resource mobilization efforts, advancing transportation initiatives in the region. As a project of the North Florida TPO, a 501(c)3 non-profit organization, and a designated member of the U.S. Department of Energy's Clean Cities Coalition Network, the North Florida Clean Fuels Coalition is an unbiased advocate for clean fuels and advanced vehicle technologies in Baker, Clay, Duval, Nassau, Putnam and St. Johns counties. Through the coalition's activities, stakeholders receive financial, technical and educational support to increase the use of clean fuels including biofuels, electricity, propane, natural gas, and hydrogen. This plan will guide these activities over the next several years.

2.1 Mission and Vision

The North Florida CFC has established mission and vision statements that guide its daily activities and shape its future outlook, including this plan.

Mission
To reduce petroleum consumption by increasing alternative fuels, vehicles and infrastructure diversity in North Florida while enhancing the region's economic competitiveness and quality of life. The Coalition does this through outreach, education, and strategic investment.

Vision
North Florida residents, businesses, governments and organizations embrace alternative fuels as a viable, easy, accessible and beneficial choice for fueling transportation.

2.2 Unprecedented Opportunity

This Clean Fuels Master Plan update was established in part to leverage state and federal opportunities to increase sustainability and resilience in the transportation sector. Below is a summary of these drivers. **Appendix A** includes a more comprehensive review of funding opportunities, regulatory actions, and private sector incentives for clean fuels.

As an independent regional transportation planning agency, the North Florida TPO utilizes federal and state transportation funding in collaboration with stakeholders to implement initiatives to advance clean fuels. The North Florida TPO / CFC has utilized funding sources including Congestion Mitigation and Air Quality (CMAQ) and Transportation Regional Incentive Program (TRIP) to directly fund fleet clean fuels vehicle transitions or clean fuels infrastructure development. These previously funded projects included purchasing new or converting existing vehicles to use compressed natural gas (CNG), constructing CNG fueling stations for public and private fleet use, purchasing new liquified natural gas (LNG) equipped locomotives and fuel cars, and installing electric vehicle (EV) charging stations. The goal of these investments has been to modernize fleets with a focus on environmental sustainability, resilience, health and safety, equity and social justice, and long-term cost savings.

The Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA), enacted in 2021 and 2022, respectively, represent the largest investments in clean fuels in U.S. history. The IIJA sets aside approximately $6.5 billion ($320 million in Florida) for strategies that reduce transportation emissions and $7.5 billion ($198 million in Florida) for electric vehicle (EV) infrastructure. A $5 billion discretionary grant program will provide funding for zero- or low-emission school buses. IRA provides $1 billion to replace heavy-duty vehicles with clean fuels alternatives and expands existing programs, such as tax credits and incentives for purchasing clean fuels, vehicles and infrastructure.

In North Florida, much of this funding will be administered locally, either via FDOT District 2 or by the North Florida TPO. The region's electric utilities, including JEA and FPL, have also developed robust programs for incentivizing electric vehicles and infrastructure. These funding opportunities can strengthen the region's economic, social and environmental resilience by making clean fuels accessible for North Florida fleets. By aligning this plan with funding programs, the Coalition intends to maximize positive impact on North Florida's transportation system.

2.3 Plan Structure

This plan includes six major sections.

- **Fuels (Section 3)** defines the various clean fuels and describes their sources, production methods, energy content, price, infrastructure requirements and availability. Alternative fuel vehicles are contrasted for fuel economy, cost, range and emissions. Differences between clean fuels and vehicles determine their best use for North Florida fleets.
- **Equity and Environmental Justice (Section 4)** addresses the effects of transportation emissions on communities in North Florida, and how allocating federal funds for clean fuels in North Florida can improve outcomes.
- **Baseline and Forecast (Section 5)** summarizes clean fuels adoption trends in North Florida since 2016. Forecasts suggest a continued decrease in petroleum consumption in the coming decades, with a simultaneous growth in clean fuel use.
- **Goals (Section 6)** describes targets the North Florida Clean Fuels Coalition has established to reflect the region's ambitions to expand fuel diversity and realize the benefits of petroleum alternatives.
- **Strategies (Section 7)** to achieve goals include opportunities to displace fuel usage and advance clean fuel adoption for fleets across North Florida.
- **Appendices (Section 8)** include detail on funding opportunities, methods used to develop this plan, and analysis of fleet data.

2.4 Methodology

The goals, strategies and opportunities outlined in this plan derive from analysis of North Florida fleet data. Planners sent a request for data to more than 40 organizations. Fifteen organizations submitted data (*Table 1*) that was reviewed for quality and consistency, and each fleet asset was sorted into 20 different use cases (e.g., light duty passenger car, medium duty school bus, heavy duty refuse truck, etc.).

Analysts considered nine alternatives to gasoline and diesel for each use case, as applicable, including hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), diesel hybrid electric vehicles (Diesel HEV), electric vehicles (EV), biodiesel (B20), compressed natural gas (CNG), liquefied natural gas (LNG), propane (LPG), and ethanol (E85). Only applicable alternatives were considered. For example, biodiesel was not considered for light-duty passenger cars, since they predominately operate with gasoline.
The analysis estimated the environmental costs, or footprint, for each scenario, including metrics for petroleum use (barrels) and greenhouse gas (GHG) emissions (metric tons of carbon dioxide equivalents). It also estimated economic costs, or capital and operating costs, for each scenario, including infrastructure, incremental cost of vehicles, fuel, maintenance and repair, insurance, and depreciation.

Table 1: Fleets Included in the Study

Fleet	Fleet Abbreviation
City of St. Augustine	CSA
Feeding Northeast Florida	FNF
Fernandina Beach	FDB
Green Cove Springs	GCS
JEA	JEA
JTA	JTA
Nassau County	NAC
Nassau TRANSIT	NCT
Neptune Beach	NTB
Orange Park	ORP
Ride Solution	RSP
St. Augustine Beach	SAB
St. Johns County	SJC
Sunshine Bus Company	SBC

The analysis calculated the Net Present Value (NPV) for nearly 800 scenarios, including gasoline, diesel, and clean fuels alternatives for each use case, summing costs over each fleet asset's lifetime. For light duty vehicles the lifetime is 12 years and for medium and heavy-duty vehicles it is 15 years. Economic performance differences between gasoline / diesel and alternative scenarios for each use case reveals if clean fuels will be cost effective. The analysis also compares reduction in greenhouse gas GHG emissions (abatement) for all alternatives. Greenhouse gas emissions result from waste when converting fuel to useful work. In addition to providing insight into each scenario's environmental benefit, GHG abatement also estimates efficiency. Each scenario's cost-effectiveness was indexed by dividing GHG abatement by the total required investment (incremental vehicle cost plus total infrastructure cost).

See **Appendix B** for more details on methods.

3 Fuels

Clean fuels are non-traditional energy sources that can power vehicles in lieu of conventional gasoline and diesel. These fuels are derived from renewable resources or produced through processes that have lower environmental impacts compared to fossil fuel extraction and combustion. The clean fuels included in this analysis are biodiesel (B20), electricity, hydrogen, ethanol (E85), natural gas (both compressed and liquified), and propane. These fuels are the focus of the U.S. Department of Energy's Clean Cities Coalition Network and the Energy Policy act of 1992. The six alternative fuels considered in this plan are used in a variety of light-, medium- and heavy-duty vehicles. This section defines these clean fuels, their sources, production methods, infrastructure requirements, and availability, and compares their energy content, fuel economy, cost, range and emissions.

3.1 Biodiesel

Producers derive biodiesel, a cleaner-burning renewable fuel, from sources such as vegetable oils, waste restaurant grease and animal fats. Ongoing research explores algae as a biodiesel feedstock. Despite ongoing research, widespread adoption isn't anticipated for at least a decade, hindered by high upfront costs. Biodiesel shares many physical properties with petroleum diesel and is compatible with existing diesel engines and fueling infrastructure.

Biodiesel comes in a variety of blends, the most common of which are B5 (five percent biodiesel, 95 percent diesel), and B20 (20 percent biodiesel, 80 percent diesel). Blends lower than 20 percent are not considered an alternative fuel. B5—and lower-level bends—are approved for safe operation in any diesel-powered vehicle without any modifications and are often called "diesel" at the pump with no separate labeling required. Most diesel engines can operate on B20 without modification, with minimal impact on fuel economy. Pure biodiesel (B100) is less commonly used as a transportation fuel since engines may require modification to run on pure biodiesel. Biodiesel's enhanced lubricity may extend the lifespan of diesel engines.

While advancements in diesel vehicle technology since 2010 have led to reduced tailpipe emissions, biodiesel results in significantly less life cycle emissions, which consider the entire production and use process. Biodiesel combustion releases "biogenic" carbon dioxide (CO_2) emissions, which are re-absorbed by plants (from which biodiesel is derived). This cyclical process results in emissions reductions proportional to the blend percentage. For example, B100 exhibits the greatest GHG reduction relative to petroleum diesel (as much as 75 percent). Specific emissions reductions depend on the feedstock used in biodiesel production.

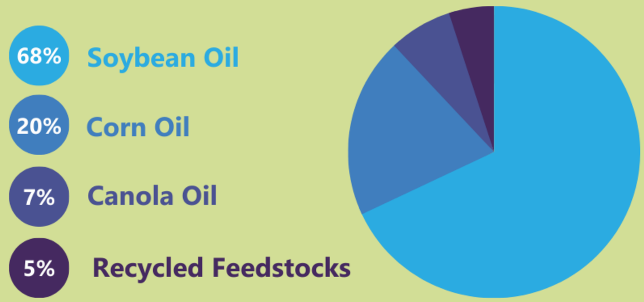
Biodiesel is made at production facilities and shipped to fuel distributors which supply fleets or conventional retail gas stations. Biodiesel is distributed or produced by FPL and BioDiesel Las Americas in Florida.

BIODIESEL

Biodiesel is a biodegradable energy source made from plant oils or animal fats that is commonly blended with diesel fuel for use in diesel engines.

SOURCES

Biodiesel can be produced from a variety of feedstocks. Vegetable oils (mainly from soybeans) are the primary feedstocks for U.S. biodiesel production.



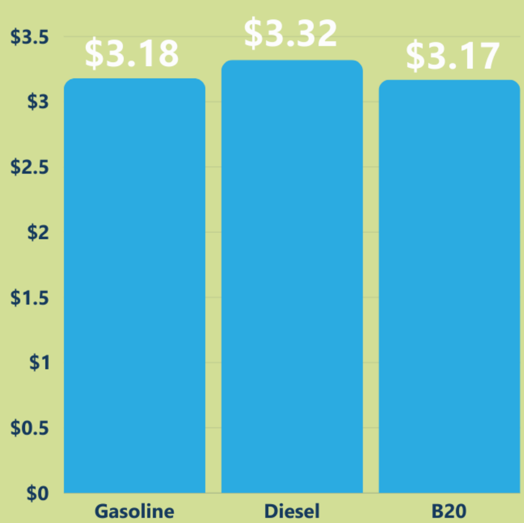
Feedstock inputs to U.S. biodiesel production, 2021

5% biodiesel, 95% diesel

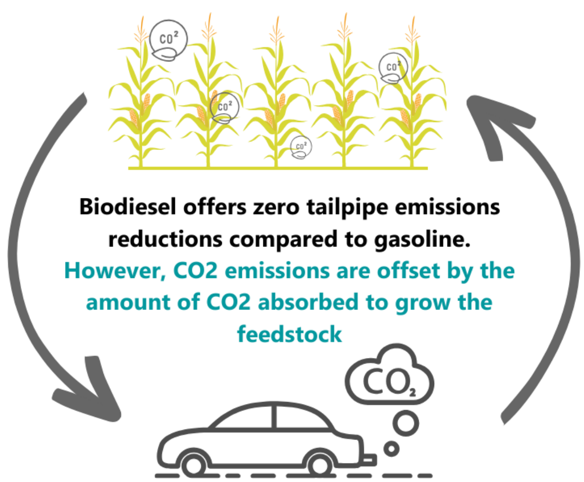
6-20% biodiesel, 80-94% diesel

100% biodiesel

Average price/GGE (2020-2023)



B20 and lower-level blends can be used in diesel vehicles without any engine modifications



3.2 Electricity

Electric vehicles (EVs), including battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs) rely fully or partially on electric motors. EVs pull electricity from the grid and store it onboard in batteries but can also harness energy through regenerative braking. While BEVs are powered exclusively by electricity, PHEVs supplement electric power with liquid fuel (typically gas or diesel) in an internal combustion engine (ICE). PHEVs include batteries that are periodically charged like BEVs. HEVs are like PHEVs, but do not require periodic battery charging.

Both BEVs and PHEVs operating in battery-mode produce zero tailpipe emissions. However, emissions are associated with producing electricity from primary energy sources, including coal, natural gas, and nuclear materials, and renewable resources like wind, solar, and hydropower. Most electricity is generated by natural gas, nuclear, and coal with renewable energy sources generating roughly 5% of electricity consumed in Florida in 2020.

Powering an EV from renewable sources reduces a vehicle's life cycle emissions. However, even when derived from fossil fuels, electric vehicle operation yields 53% fewer emissions than traditional gasoline vehicles, since electric motors are over three times more efficient than internal combustion engines.

Today BEVs often have shorter driving ranges, averaging around 260 miles compared to over 400 miles for gasoline vehicles. PHEVs provide an all-electric drive range of 15-50 miles, supplemented by liquid fuel.

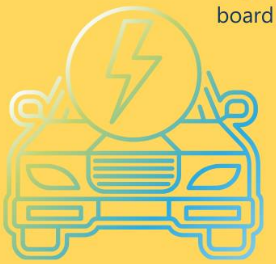
Battery charging times vary, with Level 1 chargers taking 40-50 hours for a full BEV charge, while Level 2 chargers can complete a BEV charge in 4-10 hours. Direct Current Fast Charging (DCFC) stations offer rapid charging, capable of charging a BEV to 80% in just 20 minutes to 1 hour. The United States has over 60,000 publicly available charging stations, with approximately 200 across North Florida. The public charging infrastructure is expanding rapidly to meet the growing demand for EVs, especially as their costs decrease.

Initial costs for PHEVs and BEVs are higher than gasoline or diesel vehicles. Incentives, such as tax credits, aim to alleviate this burden, with the Inflation Reduction Act of 2022 offering consumers up to $7,500 for new EV purchases and up to $4,000 for used EVs bought in 2023 or later. Market analysis indicates that despite the higher upfront cost, EVs offer reduced operating costs and substantial fuel savings, potentially saving drivers up to $14,500 on fuel costs over 15 years.

ELECTRICITY

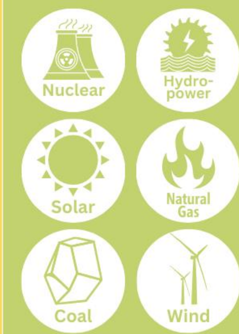
EVS & PHEVS

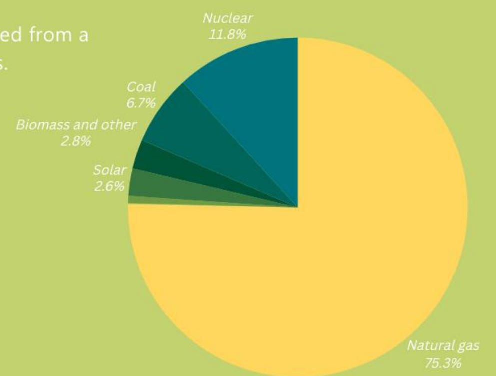
Electric vehicles (EVs) include all-electric vehicles and plug-in electric hybrid vehicles (PHEVs). EVs draw electricity from the grid and store it on-board in batteries that fuel an electric engine. PHEVs utilize both an electric engine and an internal combustion engine for fuel efficiency



SOURCES

Electricity can be produced from a variety of energy sources.





Florida Electric Production Resource Mix, 2020

EVs are roughly **4X** as fuel efficient as their gasoline-powered counterparts

UPFRONT COST

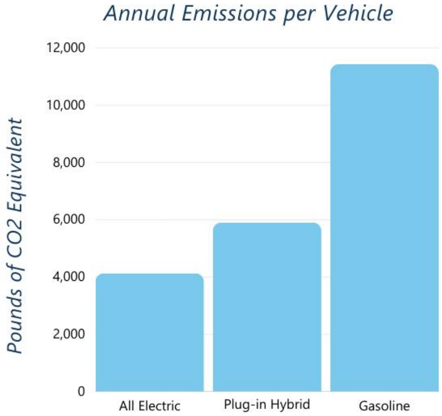
The average price of an EV in 2021 was $10,000 higher than the industry average

LIFECYCLE COST

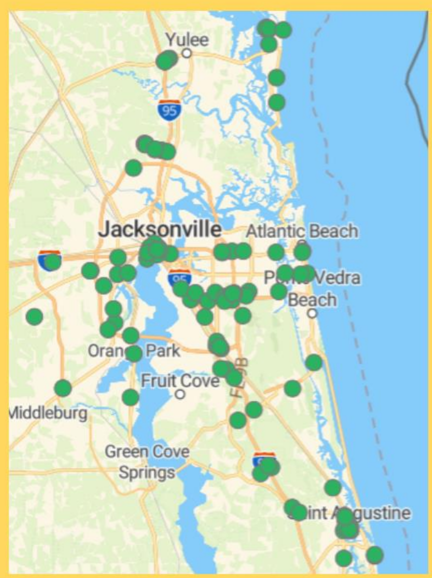
The average cost to fuel an electric car is $485 per year, compared to $1,117 per year for a gas-powered vehicle. EV drivers tend to spend **60%** less each year on fuel costs compared to drivers of gas-powered vehicles.

In general, EVs cost HALF as much to repair and maintain as gas-powered vehicles

Annual Emissions per Vehicle



While EVs produce zero tailpipe emissions, the electricity source will affect an EV's lifecycle emissions



Public level 1, level 2, and DC fast charging stations in North Florida

3.3 Hydrogen

Hydrogen is the most abundant element in the Universe and can be used as an alternative transportation fuel. It can be burned directly or mixed with oxygen in a fuel cell, which is used similarly to an EV battery. A fuel cell electric motor is 2-3 times more efficient than an internal combustion engine. However, hydrogen's low volume energy content requires storage at high pressures and low temperatures. Most current applications of hydrogen store it onboard as a compressed gas in high-pressure tanks.

Major research and development in recent years to make this fuel more accessible to the public has resulted in rollout of light-duty vehicles to retail consumers, as well as medium-and heavy-duty buses and truck fleets. Current market light-duty FCEVs have a driving range of over 300 miles and can refuel in 3-5 minutes, comparable with petroleum and gasoline vehicles.

While hydrogen vehicles have zero tailpipe emissions, hydrogen production is not necessarily emissions free. Like electricity, hydrogen is an energy carrier created from other primary energy sources. The main method for hydrogen production today is steam methane reforming, where steam reacts with natural gas under pressure to produce hydrogen ("grey hydrogen") without capturing waste GHG emissions. Hydrogen can also be produced through electrolysis or splitting a molecule of water (H_2O) to capture hydrogen, with oxygen as a byproduct. Electrolysis is an energy intensive process but can be powered by 100% renewable energy ("green hydrogen").

Although the production of grey hydrogen results in carbon emissions, it consistently demonstrates emissions reduction compared to gasoline vehicles across various scenarios, except in instances where the hydrogen is produced through electrolysis from conventional grid electricity. As the renewable content in the grid mix increases, however, GHG emissions associated with electrolysis are mitigated. Blue hydrogen is an environmental improvement over grey, as it captures and permanently stores waste GHG emissions. While promising, capture and storage of GHG emissions remains an unproven technology at scale. Although green hydrogen has no net emissions, its availability is limited.

Economic barriers hinder widespread adoption of hydrogen, with higher costs for vehicles, infrastructure, and fuel. In 2022 as natural gas prices spiked, hydrogen produced from natural gas reached $10/kg and green hydrogen reached $16/kg. As a result, operating costs for hydrogen vehicles may be higher than for other alternative fuel vehicle options.

Despite technological advances, hydrogen fuel infrastructure remains in its infancy. There are currently 59 retail hydrogen stations across the U.S., primarily in California where most hydrogen fuel is produced. Transport from production facilities to fueling station presents many challenges, requiring a dedicated pipeline network. There are no hydrogen fuel stations in Florida, although several major energy producers, including TECO and NexEra Energy, are currently gearing up to provide hydrogen to customers in the state.

HYDROGEN

The most abundant element in the Universe, Hydrogen is an energy carrier that can be used to store, move, and deliver energy produced from other sources

PRODUCTION

Hydrogen can be produced via steam-methane reformation or electrolysis

Steam-methane reformation is a process where steam and natural gas are used to extract hydrogen molecules from methane

Electrolysis is a process where water is split into hydrogen and oxygen molecules via an electric currenty

95% of global hydrogen production is done through steam methane reforming

FCEVs

Fuel Cell Electric Vehicles (FCEVs) convert hydrogen to electricity to power an electric engine

- Zero emission vehicles
- 2-3x more efficient than conventional ICE
- 4 minute fueling time
- Driving range around 300 miles

Hydrogen contains 4x less energy by volume than the gasoline equivalent

Hydrogen is color coded to distinguish energy source and production method

The majority of hydrogen produced and consumed in the United States is **grey**

Grey hydrogen is produced from fossil fuels commonly through the steam-methane reformation process.

Blue hydrogen is sourced from fossil fuels, but the CO2 is captured and stored underground. This process is categorized as carbon neutral.

Green hydrogen is produced via water electrolysis by employing renewable electricity. There is no CO2 produced or released during this process.

3.4 Ethanol

Ethanol is alcohol, derived from diverse plant material fermentation such as corn and sugarcane. It is also a renewable fuel. Ethanol fuels come in various blends with gasoline. The most common is E10 – 10 percent ethanol and 90 percent gasoline. More than 98 percent of gasoline in the United States is E10. E15 (10.5-15 percent ethanol) and E85 (51-83 percent ethanol) blends are less common. E15 is approved for use in light-duty vehicles model year 2001 and newer. E85 can be used in flexible fuel vehicles (FFVs), which have an internal combustion engine specifically designed to run on E85, gasoline, or a blend of the two. Pure ethanol (E100) is rarely used as an alternative fuel because it is feasible only in engines expressly designed or modified for this purpose. Only blends 85% or higher are considered alternative fuels.

When ethanol is blended with gasoline, it oxygenates the fuel, reducing air pollution. Ethanol also has a higher-octane number than gasoline, providing increased power and performance in vehicles. Ethanol contains 30% less energy per gallon than gasoline and can result in reduced fuel economy at higher blends.

Corn is the source of most ethanol (94 percent), with 40 percent of all corn grown in the United States used for ethanol production. Ethanol produced from corn has a positive energy balance, meaning that more energy is contained in the fuel itself than the amount to produce it. Cellulosic ethanol—derived from non-food-based feedstocks such as crop residues and wood—has an even higher energy balance and uses less fossil fuel energy, resulting in lower levels of life cycle GHG emissions. Starch and sugar-based feedstock (e.g., corn) conversion to ethanol is a mature, cost-effective technology. Creating ethanol from cellulosic feedstocks, often waste products, or purposefully grown energy crops, presents distinct advantages, including utilizing land unsuitable for traditional crops. However, this process must become more cost effective to become a viable option for transportation fuels.

Like biodiesel, ethanol emissions are biogenic – CO_2 released from burning ethanol is offset by the CO_2 captured when growing the feedstock. Life cycle analyses indicate that GHG emissions are reduced on average by 40 percent with corn-based ethanol, and 88-108 percent with cellulosic feedstocks.

E85 can be found at over 4,494 stations across the country, including one private and 26 public stations in North Florida. Although Florida does not require gasoline to be blended with ethanol, it is widely used, making Florida the third-largest consumer of fuel ethanol in the nation. However, there are no fuel ethanol production plants in the state.

ETHANOL (E85)

Ethanol is a renewable fuel made from plant materials that is commonly blended with gasoline for use in both Conventional and Flexible Fuel Vehicles (FFVs

SOURCES

Corn

Cellulosic (Wood Residue)

Sugar Cane

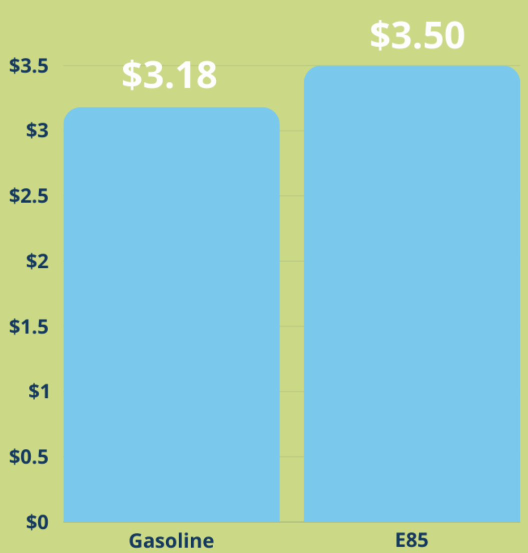
In the United States, 94% of ethanol is produced from corn grain

E10
More than 98% of U.S. gasoline is E10
10% ethanol

E15
Compatible with 2001 or newer light-duty conventional vehicles
10.5-15% ethanol

E85
Blends E85 and higher are considered alternative fuels
51-83% ethanol

Average price/GGE (2020-2023)



E85 contains roughly 30% less energy than gasoline per gallon

GHG emissions reductions on a life cycle basis vary by source type

40% reduction compared to gasoline

88-108% reduction compared to gasoline

3.5 Natural Gas

Natural gas is an alternative fuel primarily composed of methane. It can be used to power light-, medium- and heavy-duty natural gas vehicles (NGVs). The growing interest in natural gas as an alternative fuel source is attributable to its clean burning qualities, domestic availability and low price.

Most natural gas consumed in the U.S. is produced in North America. Despite accounting for 30% of the nation's energy use, less than one percent is used for transportation. Most natural gas is fossil fuel-derived, extracted from subsurface rock formations. As a transportation fuel, it is either compressed natural gas (CNG), filtered and compressed to a high pressure, or liquified natural gas (LNG), purified and super-cooled. CNG and LNG result in progressively more energy dense fuels suitable for storage and combustion in engines. Renewable natural gas (RNG or biomethane) is refined from cellulosic or advanced feedstocks, anaerobic digestion, or gasification of organic matter. RNG can be compressed or liquefied as a transportation fuel.

NGVs can be either dedicated, running solely on natural gas, or bi-fuel, with separate systems for natural gas and gasoline. CNG has similar fuel economy to gasoline vehicles on a GGE basis, while LNG is suitable for longer ranges, storing more energy per volume. However, LNG is less common for commercial use due to higher production and storage costs. NGVs, comparable in tailpipe emissions to gasoline and diesel vehicles, offer reductions in life cycle emissions, depending on vehicle fuel efficiency and natural gas production. CNG production consumes less petroleum and has slightly lower GHG emissions than LNG due to lower energy requirements. RNG can be a net zero emissions fuel.

There are four public CNG stations and one public LNG fueling station in North Florida. Natural gas infrastructure installation costs vary based on size, capacity, and dispensing method, but are capital intensive. Much of the CNG and LNG infrastructure has been developed via private investment. Converting vehicles by qualified retrofitters can be economically viable, with upfront costs offset by lower operating and maintenance costs; however, most fleets prefer original equipment manufacturer (OEM) vehicles. CNG and LNG prices are typically negotiated between fleets and suppliers to provide cost savings compared to gasoline and diesel on a per-gallon equivalent basis. This offsets natural gas's lower fuel economy by its lower fuel price.

NATURAL GAS

Natural gas is a mixture of methane (CH_4) and other hydrocarbons. Although it accounts for about 30% of the energy used in the United States, less than 1% is used for transportation fuel.

Natural gas must be either compressed or liquified for use as a transportation fuel

CNG is produced by compressing natural gas to less than 1% of its volume at standard atmospheric pressure.

LNG is natural gas in its liquid form. LNG is produced by purifying natural gas and super-cooling it to -260°F to turn it into a liquid.

SOURCES

A majority of natural gas in the U.S. is produced via fossil fuel extraction

Renewable natural gas is produced by processing gases released from decomposing organic matter

Both conventional and renewable natural gas must be compressed or liquified for use as a transportation fuel

Light-duty vehicles running on conventional natural gas can reduce GHG emissions by 15% compared to their conventional counterparts

Average price/GGE (2020-2023)

NGVs

Natural gas vehicles run on natural gas in either a compressed or liquified form. LNG vehicles are able to travel longer distances than their CNG counterparts and are primarily heavy-duty, long-range trucks.

Dedicated NGVs run exclusively on natural gas

Bi-fuel NGVs run on both natural gas and gasoline

3.6 Propane

Propane, or liquified petroleum gas (LPG), is an alternative fuel used to power light-, medium- and heavy-duty propane vehicles. Propane accounts for two percent of energy use in the U.S., less than three percent of which is used for transportation. It occurs as a gas at standard temperature and pressure but is compressed and liquified for use as a fuel. Propane is produced as a by-product of natural gas processing and crude oil refining. Interest in LPG as a fuel stems from its clean-burning qualities, high-energy density, domestic availability, and relatively low cost, making it the world's third most common transportation fuel behind gasoline and diesel.

There are two types of propane vehicles: dedicated, which run on propane only, and bi-fuel, which may run on both propane and gasoline. Because propane fuel has a lower energy density than gasoline, the fuel economy of propane vehicles is lower. However, this is offset by its lower per-gallon cost and lower maintenance costs. Propane vehicles produce tailpipe emissions comparable to gasoline and diesel vehicles but reduce life cycle GHG emissions by nearly 13%.

Although propane is most often used in medium- to heavy-duty applications, light-duty vehicles are also available. However, propane is not currently widely available as an alternative to diesel engines. Propane vehicles cost more than their gasoline counterparts, with investment predicated on life cycle fuel cost savings.

Propane fueling infrastructure is like gas or diesel, consisting of a fuel tank, pump and dispenser. Extra safety equipment is required to dispense the compressed fuel safely. Eight public LPG fueling stations are in North Florida, predominantly centered in Duval and Clay counties. Propane marketers typically provide private fueling infrastructure to fleets relatively inexpensively as part of a long-term fuel purchase agreement.

Renewable propane is produced from biomass feedstocks such as cooking oil, animal fats and 20% dimethyl ether produced in biodiesel refineries. Chemically identical to propane, renewable propane may replace or be blended with propane in all applications. Production is anticipated to align with the increasing output of renewable diesel and sustainable aviation fuels, as renewable propane can be generated as a byproduct. The primary advantage of renewable propane over conventional is its lower carbon intensity and environmental impact. Overall carbon reduction benefits, however, depend on the feedstock used to produce the fuel. Research to reduce implementation barriers such as feedstock production and cost is ongoing.

PROPANE

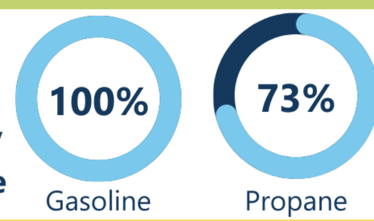
Propane, also known as liquified petroleum gas (LPG), is a clean-burning alternative fuel. It occurs as a gas at standard temperature and pressure, but is compressed and liquified for use as a fuel.

SOURCES

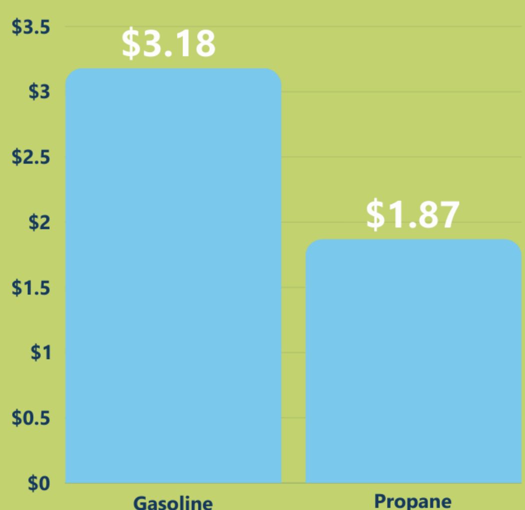
Conventional propane is a by-product of natural gas processing and crude oil refining

Renewable propane (autogas) is produced from biomass feedstocks such as cooking oil, and animal fats

Propane contains roughly 3/4 the amount of energy by volume as gasoline



Average price/GGE (2020-2023)



Vehicles

Although propane fuel has a lower energy content than gasoline, propane engines are likely to last longer and have lower maintenance issues

Dedicated propane vehicles run exclusively on propane

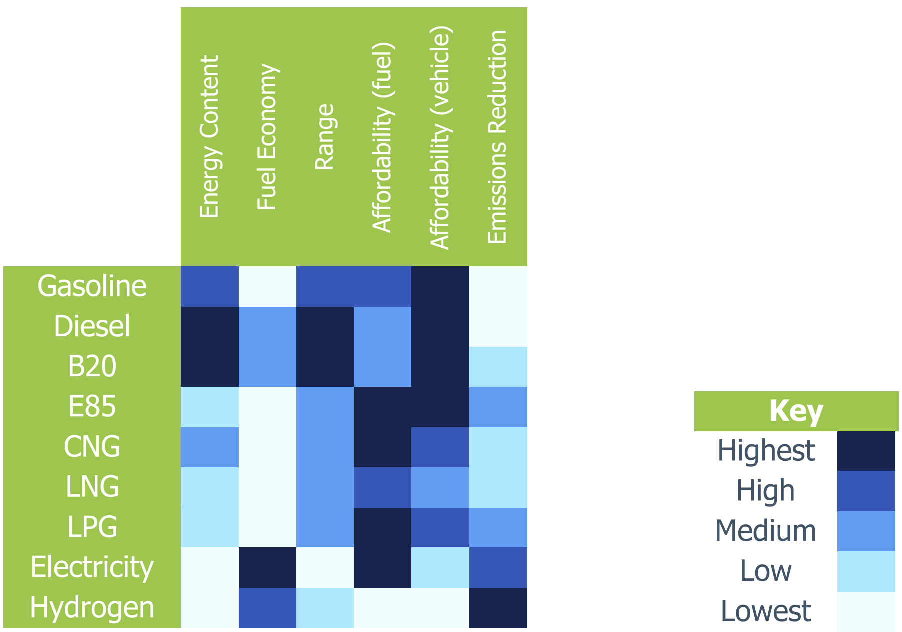
Bi-fuel propane vehicles run on either propane or gasoline, permitting them greater range than dedicated propane vehicles

Vehicles using propane can reduce GHG emissions by 13% compared to their gasoline counterparts

3.7 Fuels Comparison

This section compares alternative and conventional fuels based on various criteria, including energy content, energy efficiency, fuel cost, vehicle cost, vehicle range, and emissions reductions. *Table 2* visually illustrates the relative comparison of these factors, using darker colors to indicate higher values and lighter colors for lower values, defined in the key below. For instance, the table shows that diesel and B20 fuels have the highest energy content (dark), while electricity and hydrogen have the lowest (light). Similarly, hydrogen is the least affordable fuel while E85, CNG, LPG, and electricity are the most affordable fuels, and have relatively comparable prices. Further details on each factor and their respective measurement units are discussed below.

Table 2: Transportation Fuels Relative Comparison



3.7.1 Energy Content

Fuel energy content, measured in British Thermal Units (BTU), significantly impacts transportation fuel efficiency. *Table 2* compared alternative fuel energy content in Gasoline Gallon Equivalent (GGE). Diesel and B20 have a comparable energy content, approximately 12-14% higher than gasoline. E85 and LPG contain roughly 27% less energy per gallon than gasoline. CNG has about 12% less energy on a per-Therm (100,000 BTUs) basis, while LNG has 33% less energy. Electricity, measured in kWh, has relatively low energy content compared to gasoline on a GGE basis. Hydrogen fuel, though comparable to gasoline by weight, has low energy content by volume. These complexities underscore the challenges in evaluating fuel energy content, emphasizing the need for additional considerations like fuel economy and price for a comprehensive understanding of total costs.

3.7.2 Fuel economy

While energy content provides a fundamental measure for comparing alternative fuels to gasoline and diesel, fuel economy is a more practical for assessing alternative fuels' efficiency and applications. *Table 2* compares relative fuel economy for mid- to light-duty vehicles powered by gasoline, diesel, and alternative fuels, measured in miles per gasoline gallon equivalent (MPGGE). Although specific fuel economy values vary based on the vehicle make and model, general ranges facilitate meaningful comparisons. Despite having the lowest energy content per GGE compared to gasoline, electric and hydrogen-powered vehicles (EVs and FCEVs) are the most efficient and are roughly three times more efficient than diesel and B20 vehicles due to use of electric motors instead of internal combustion engines. Fuel economies for ethanol, CNG and LPG vehicles follow, and are similar to standard gasoline vehicles.

3.7.3 Range

Vehicle range, determined primarily by on-board fuel quantity and associated weight, varies significantly among alternative fuels. While short trips dominate household vehicle use for over 99% of total trips, commercial fleets prioritize extended ranges. B20, with energy content like conventional diesel, exhibits a comparable range, roughly 15% more than conventional gasoline. EV range relies on battery capacity, with technological advancements over the last decade pushing the average from 70 to nearly 300 miles. LPG vehicles have a reduced range of 350 miles due to the slightly lower energy content of propane compared to gasoline. Natural gas vehicles operating on CNG have a range approximately 25% less than gasoline or diesel counterparts. LNG offers a range comparable to conventional fuels for long-distance travel. Flex Fuel vehicles using E85 experience a 15%-25% reduction in range. Hydrogen vehicle range, constrained by storage capacity challenges, averages around 300 miles among commercially available options.

3.7.4 Fuel Cost

Table 2 compares the relative average prices for each fuel based on data from October 2023 for the Lower Atlantic Region measured in dollars per GGE. Regional prices, generally below the national average, vary based on multiple factors. E85, CNG, and LPG costs are lower than gasoline. Biodiesel, produced and retailed regionally, may have lower costs on a local scale. While tracking for hydrogen is currently limited, available data shows that hydrogen prices have steadily increased from $16.65/GGE in July 2022 to $32.32/GGE in October 2023. LNG prices are generally higher than CNG but lower than diesel. Electricity is sold per kWh, complicating direct comparisons with gasoline prices. Nonetheless, charging an electric vehicle can be cheaper than fueling a comparable gasoline vehicle due to low electricity costs and high motor efficiency. Federal and State incentives also influence fuel prices for producers, distributors and consumers.

3.7.5 Vehicle Cost

While most Alternative Fuel Vehicles (AFVs) generally come with higher purchase or lease prices compared to conventional vehicles, exceptions include vehicles operating on B20 and E85. These fuels are considered drop-in options that can be used in existing diesel and flex fuel vehicles, respectively. The elevated prices for AFVs are attributed to technologies unique to these vehicles, such as the batteries in EVs and the reinforced fuel tanks in CNG vehicles. These price premiums limit widespread AFV adoption. To counteract this, various incentives have been implemented to mitigate the costs associated with certain AFVs. Despite the initial price challenges, many AFVs demonstrate favorable returns on investment when considering factors like fuel consumption, fuel prices and available incentives. As production volumes increase and technologies progress, it is anticipated that costs for all AFVs will decrease. *Table 2* compares the relative affordability of AFV and conventional technologies.

3.7.6 Emissions

Transportation-related air pollution includes Criteria Air Pollutants like Oxides of Nitrogen (NOx), Carbon Monoxide (CO), and Particulate Matter (PM). These pollutants, along with Volatile Organic Compounds (VOC), contribute to ground-level ozone, a harmful pollutant. These pollutants can have a severe impact on both human and environmental health. Additionally, the transportation sector is responsible for nearly 30% of anthropogenic GHG emissions in the U.S. Air pollutants and greenhouse gases are emitted during fuel production and vehicle operation, making both aspects important considerations when evaluating lifecycle emissions. All alternative fuels reduce emissions relative gasoline and diesel, indicated in *Table 2*.

Biodiesel, while comparable to conventional diesel in air quality emissions, can achieve varying GHG emissions reductions relative to blend percentage (74% reduction for B100). Electric vehicles, with zero tailpipe emissions, can cut GHG emissions by roughly 79% in Florida. Similarly, while hydrogen vehicles produce zero tailpipe emissions, lifecycle emissions are tied to production sources. Lifecycle emissions from LNG are slightly higher than CNG due to increased energy requirements in natural gas liquification. However, light-duty vehicles operating on conventional natural gas can reduce GHG emissions by 15%. Corn-based ethanol reduces lifecycle GHG emissions by roughly 40% on average. However, although E85 decreases CO_2 emissions, it slightly increases other pollutants that contribute to ground level ozone formation. Finally, while propane powered vehicles produce comparable tailpipe emissions to gasoline and diesel-powered counterparts, propane reduces lifecycle GHG emissions by 13%.

4 Equity and Environmental Justice

Fossil fuels have powered unprecedented economic growth; however, it has not come without consequences. Widespread fossil fuels combustion releases pollutants linked to adverse health effects, including respiratory disorders, cancer or premature death. Additionally, fossil fuels release carbon dioxide and other greenhouse gases into the atmosphere, contributing to global warming and sea level rise.

While everyone is affected by pollution, some populations have been more severely impacted. Low-income communities and people of color are disproportionately burdened with health hazards. One study showed that African Americans in the United States are exposed to 38% more pollution and are 75% more likely to live near facilities that produce pollution, such as landfills, power stations, major roads and other airborne particulate matter sources. These communities often experience health problems associated with hazardous pollution at greater rates. Environmental justice advocates believe environmental benefits and burdens should be distributed fairly amongst all communities, ensuring equal protection from environmental harm and meaningful participation in decision-making processes.

4.1 Environmental Justice in Jacksonville

North Florida was once home to several paper mills and other industrial facilities. While many facilities have ceased operations, their legacy pollution remains and persists in the soil, water and air. Legacy pollution and associated environmental health concerns are not evenly distributed. Health Zone 1 in Duval County (zip codes 32208, 32209, 32206, 32254, 32204, and 32202) has the largest number of minority residents, accounting for 83% of the population. Health Zone 1 also has the lowest median household income and the highest population living below the poverty line. According to the Duval County Health Department, Health Zone 1 has more distressed properties and vacant lots than other Health Zones in Duval County including 33 superfund sites, two hazardous waste sites, 58 waste clean-up sites and two dump sites. Residents in Health Zone 1 also have high rates of poor health including the highest rate of asthma emergency room visits in Duval County.

Health Zone 1 is not the only area that experiences environmental injustice in Jacksonville. According to the EPA's Environmental Justice Screening and Mapping Tool 69 disadvantaged tracts are located in Duval County. Many of these areas are disadvantaged because of transportation related issues, including diesel particulate matter exposure and traffic proximity.

4.2 Justice40 Initiative

Executive Order 14008, issued in 2021, directed 40% of federal investment tied to climate change, clean energy and other sectors to marginalized, underserved and pollution-burdened communities ("Justice40").

A community is designated as disadvantaged if it is in a census tract that is at or above the threshold for one or more environmental, climate or other burdens, and at or above the threshold for an associated socioeconomic burden. There are eight categories of burdens, including climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.

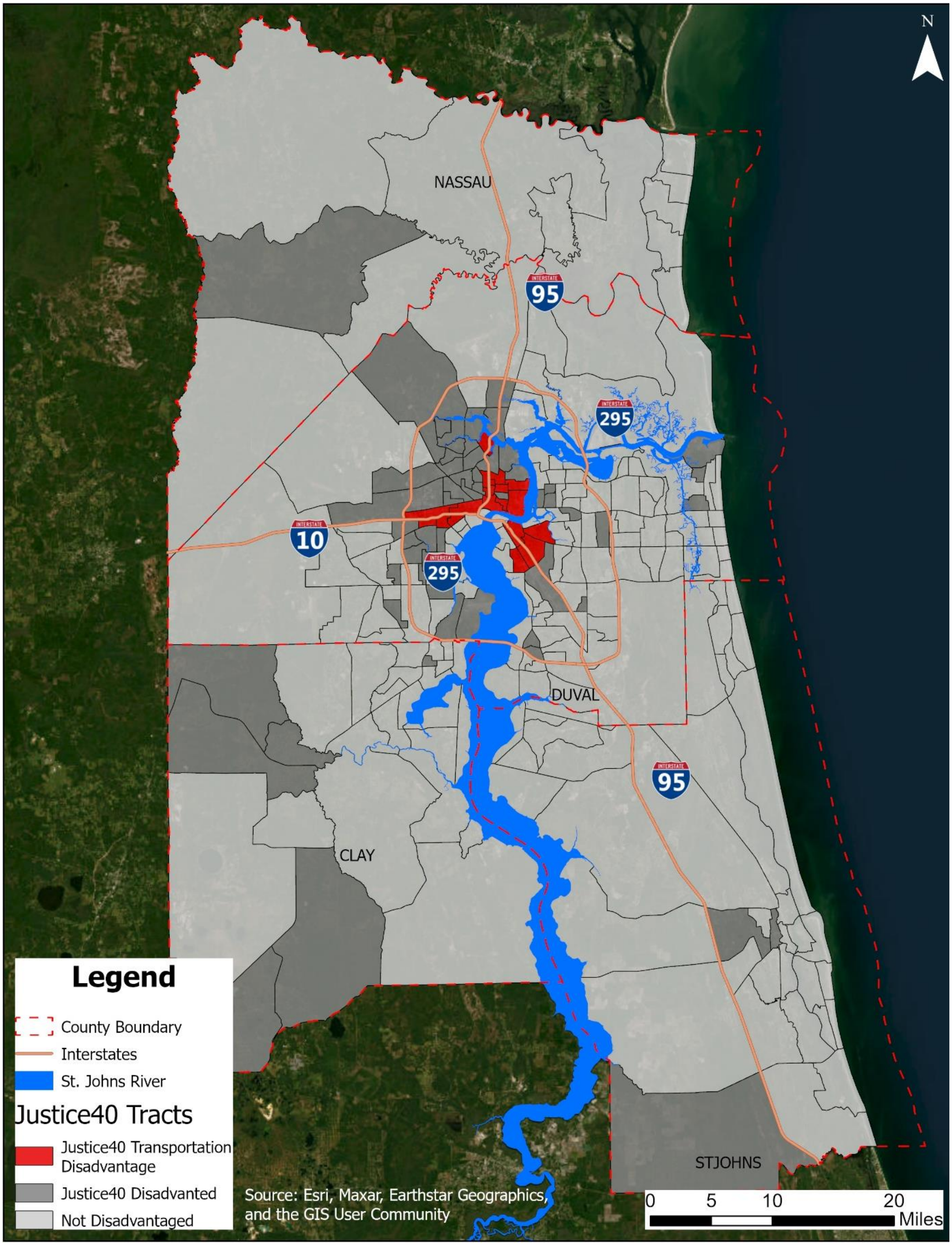
Figure 1, highlights Justice40 census tracts within North Florida. These tracks are at or above the 90th percentile for diesel particulate matter exposure or traffic proximity and volume and are at or above the 65th percentile for low income. This map illustrates that disadvantaged communities in Jacksonville also experience the highest incidence of vehicle-related pollution.

4.3 Clean Fuels Support Environmental Justice

The transportation sector contributes significantly to air pollution that has a negative impact on the health and welfare of communities. Emissions from the transportation sector contain pollutants that have been linked to health effects, including carbon monoxide (CO), oxides of nitrogen (NO_X) and particulate matter (PM). Transportation also accounts for approximately 30% of all GHG emissions in the U.S., making it the largest emitting sector in the country.

The North Florida Clean Fuels Coalition is helping reduce emissions and harmful pollution associated with the transportation sector by supporting the transition to alternative fuels in North Florida. In 2021, the North Florida Clean Fuels Coalition contributed to reducing 31 million GGE in North Florida. This effort avoided 56 thousand tons greenhouse gas and other harmful pollutant emissions from automobiles.

Figure 1: Justice40 Tracks in North Florida



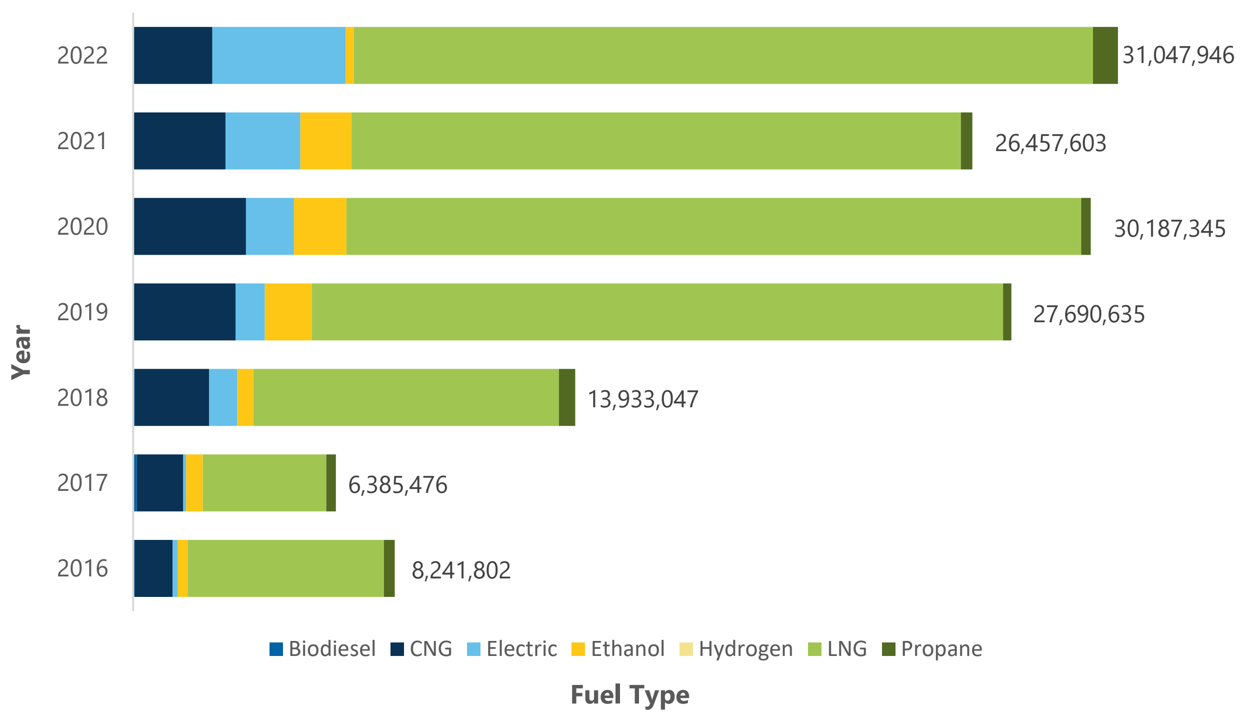
5 Baseline and Forecast

5.1 Baseline

An annual survey conducted cooperatively by the North Florida Clean Fuels Coalition and its stakeholders has collected clean fuel activity data in Baker, Clay, Duval, Nassau, Putnam and St. Johns counties since 2016. Total clean fuel consumption has increased significantly in recent years. Consumption has increased quickly for LNG and electricity. The increase in CNG and LPG was slower, while biodiesel and ethanol consumption declined over the period. Clean fuel consumption in 2022 was predominantly LNG (75%). Electricity accounted for 14%, CNG 8% and propane 3%. Ethanol represented 1% of consumption, while biodiesel accounted for 0.04%.

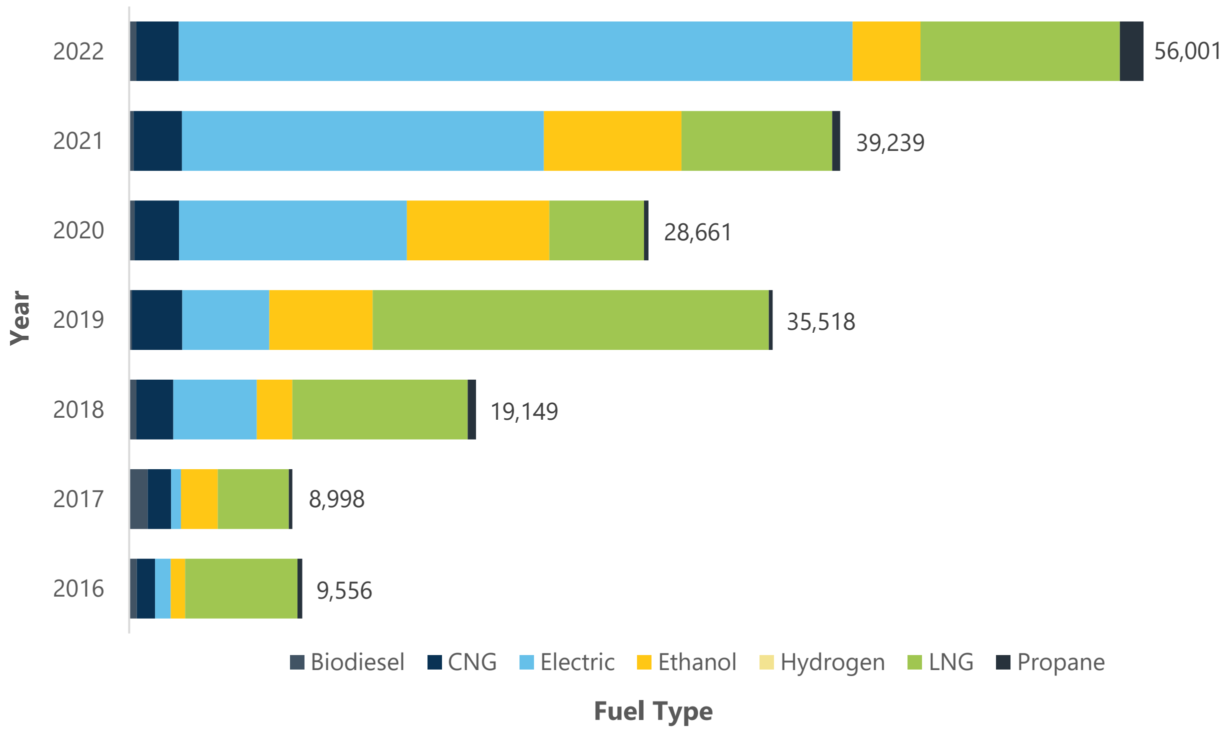
Figure 2 illustrates trends in alternative fuel consumption from 2016 – 2022 in GGE.

Figure 2: Estimated Alternative Fuel Consumption (GGE), 2016-2022



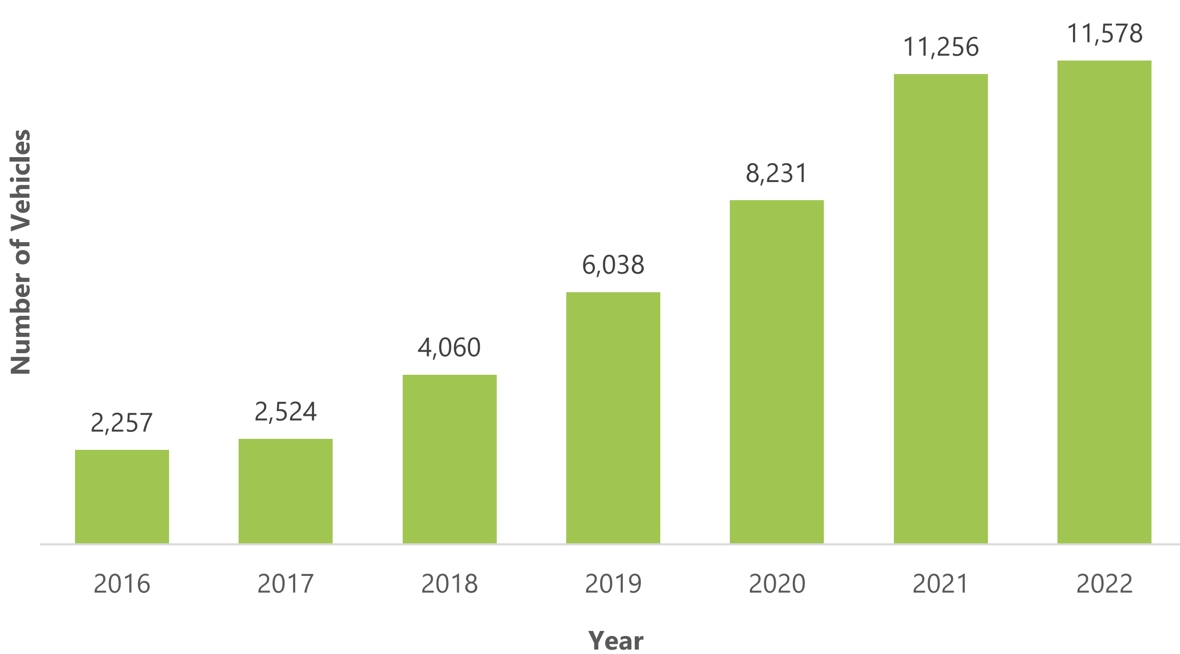
Increases in alternative fuel consumption have reduced GHG emissions. As indicated in *Figure 3*, electricity consumption contributes the most to GHG emissions reductions. LNG, ethanol and CNG consumption are also significant contributors. Comparison between *Figures 2* and *3* demonstrates the different environmental benefits between the alternative fuels. For example, although LNG consumption has increased the most from 2016-2022, increased consumption of electricity has resulted in the greatest GHG emission reduction.

Figure 3: Associated Reductions in GHG Emissions, 2016-2022



In addition to the increase in alternative fuels usage, the alternative fuel vehicle supply has continued to increase over the period 2016-2022 as shown in *Figure 4*.

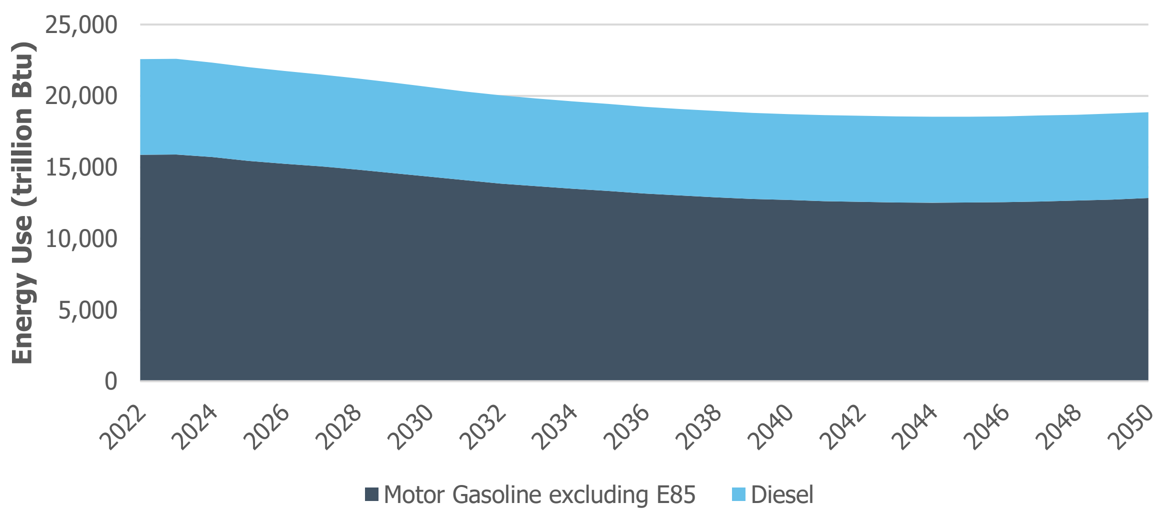
Figure 4: Alternative Fuel Vehicle Supply, 2016-2022



5.2 Forecast

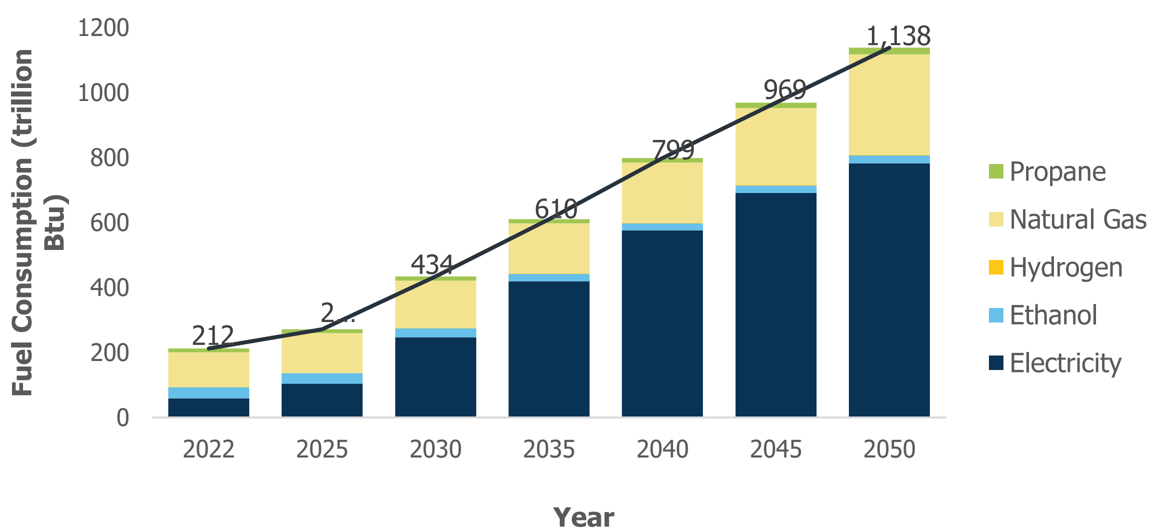
The US Energy Information Administration forecasts fuel consumption. *Figure 5* forecasts gasoline and diesel consumption through 2050. Gasoline and diesel use decreases through 2040, with a slight increase occurring thereafter. Increasing prices, increasing vehicle fuel economy, and developments in alternative fuel technologies contribute to this decrease.

Figure 5: Transportation Sector Energy Use Forecast (Gasoline and Diesel)



Although gasoline and diesel remain dominant, clean fuel use will increase. *Figure 6* shows forecasted clean fuel use. By 2050, alternative fuels comprise roughly 6% of total vehicle fuel consumption. Electricity will be the primary alternative fuel source, increasing by over 1,300% over the next 30 years. Natural gas consumption will increase steadily, while ethanol decreases slightly. Biodiesel projections are unavailable from the EIA and are not included in *Figure 6*.

Figure 6: Alternative Fuel Forecast, 2022 - 2050



Clean fuel vehicles on the road in North Florida were forecasted using registration data from the years 2016 – 2022 and data retrieved from EIA. Total alternative fuel vehicles are expected to increase significantly through 2050, growing over 1,100% from 2022. Plug-in electric vehicles are projected to have the highest growth. Biodiesel vehicles are not included in this forecast, as existing diesel vehicles can run on biodiesel without modification.

Figure 7: Alternative Fuel Vehicle Forecast in North Florida

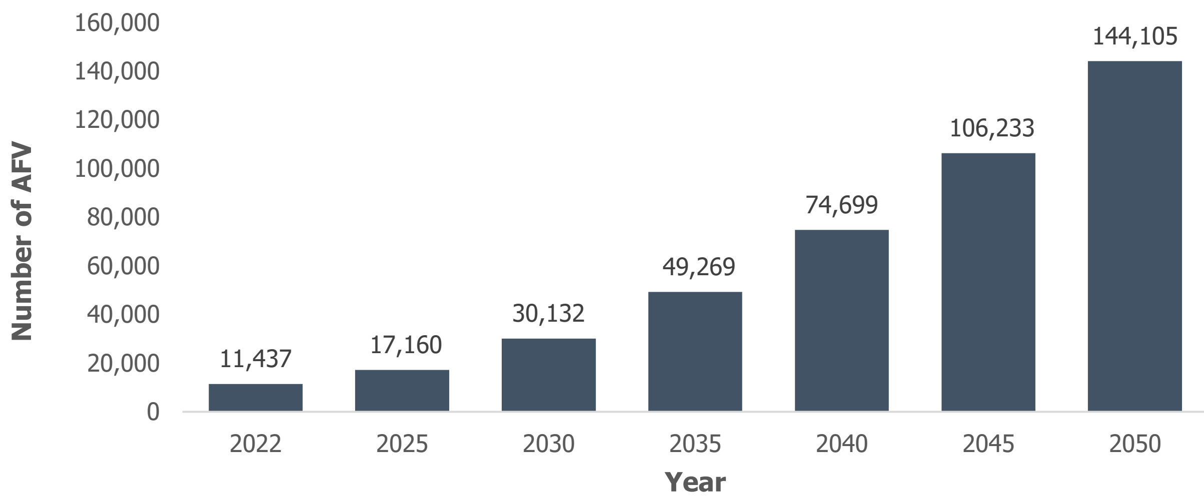
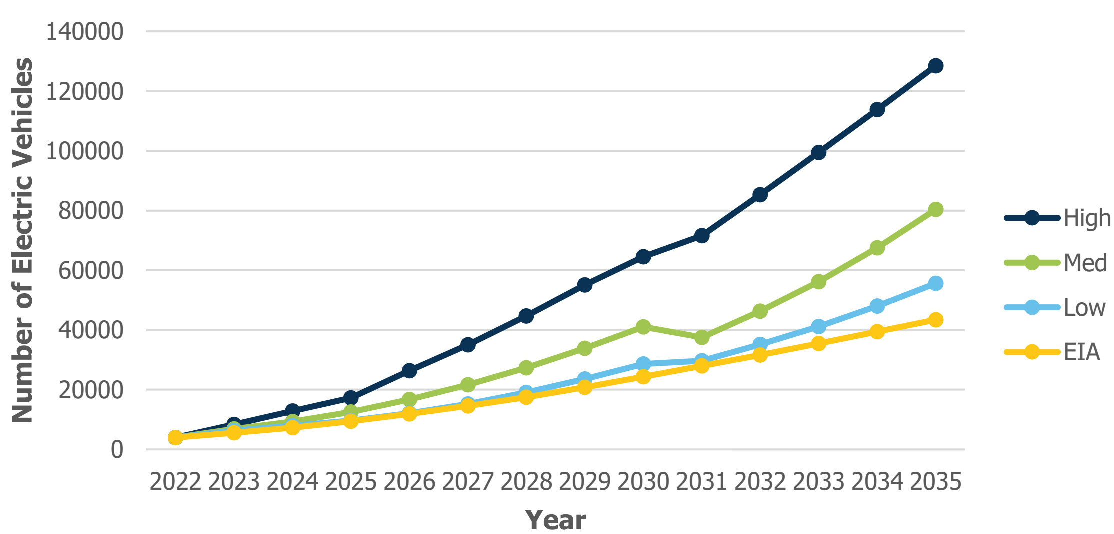


Figure 8 shows EV projections through 2035 for North Florida. It shows low, medium and high scenarios, representing the 25th, 50th and 75th percentile projections from a composite of forecasts. It also shows EIA's projection, which is the most conservative. The high scenario projects close to 130,000 EVs in 2035, while the EIA scenario projects roughly 43,000. Expanding EVs emphasizes the importance of enhancing regional electric infrastructure.

Figure 8: North Florida Electric Vehicle Fleet Forecast



5.3 Infrastructure Gap Analysis

The Alternative Fuels Data Center, operated by the DOE, compiles and synthesizes data on alternative fueling stations. Data on stations in North Florida was analyzed to determine the extent of clean fuels infrastructure in Baker, Duval, Nassau, Clay, and St. Johns counties. *Table 3* displays the number of clean fuels stations located in each county. *Table 4* includes charge port quantity for EV Level 2 and DC Fast Charge stations in each county. *Figure 9* maps the quantity and types of alternative fuel stations in North Florida.

Table 3: Number of alternative fuel stations per county

County	CNG	EV	LNG	LPG
Baker	0	1	0	0
Clay	0	9	0	1
Duval	3	115	1	5
Nassau	0	13	0	1
St. Johns	0	36	1	0
Total	**3**	**174**	**2**	**7**

Table 4: Number of EV ports per county

County	EV L2	EV DC Fast
Baker	0	4
Clay	18	0
Duval	250	89
Nassau	37	14
St. Johns	73	49
Total	**378**	**156**

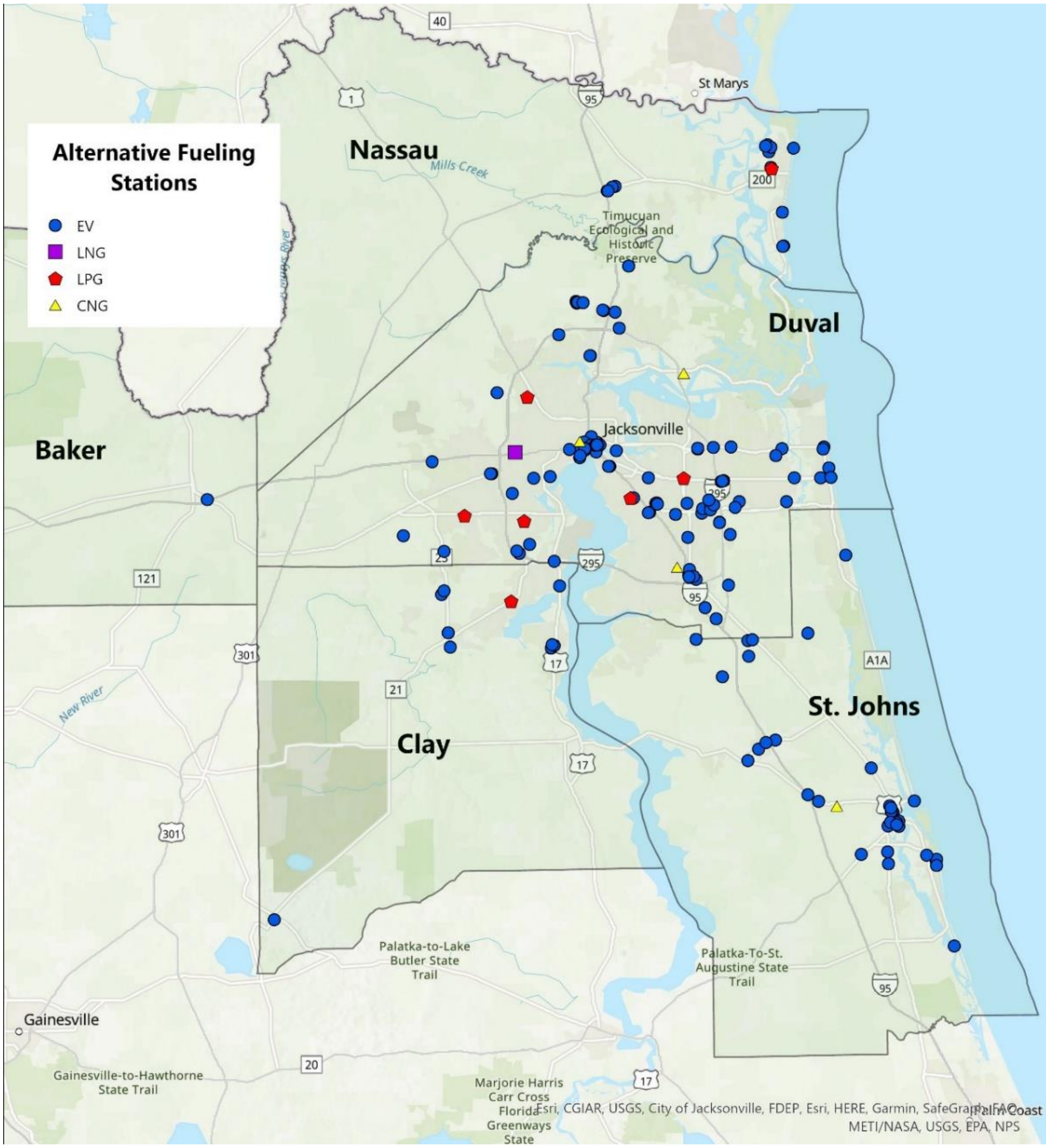
The U.S. Department of Transportation Federal Highway Administration (FHWA) is establishing nationwide alternative fueling corridors for electric, natural gas, hydrogen and propane-fueled vehicles. FHWA designated Alternative Fuel Corridors (AFCs) are valuable resources for drivers, offering routes with convenient locations for refueling clean fuel vehicles. They are also used to identify infrastructure gaps and direct federal investment in infrastructure. North Florida was the first region in the state to identify and secure AFC designations from FHWA for the following corridors:

- Interstate 10 (I-10)
- Interstate 95 (I-95)
- Interstate 295 (I-295)
- State Road A1A (SR-A1A)
- U.S. Highway 17 (US-17)
- US Highway 301 / State Road 200 (US 301 / SR 200)

The North Florida TPO / CFC conducted an Infrastructure Gap Analysis for Clay, Nassau, Duval and St. Johns counties in 2019. This analysis identified needs for additional EV, CNG, LNG and LPG infrastructure.

Since this analysis, an additional 12 EVSE stations were installed closing a gap along I-10 and providing an opportunity to close a gap along US-301 / SR-200. However, no additional CNG, LNG or LPG stations have occurred along these corridors. Filling these gaps will expand AFC designations and connect North Florida corridors to AFC designated segments elsewhere in the state.

Figure 9: All Alternative Fuel Stations in North Florida



6 Goals

The North Florida Clean Fuels Coalition has established ambitious goals in accordance with its commitments as a member of the US DOE's Clean Cities Coalition Network:

1. **Reduce Greenhouse Gas Emissions (GHG) by 20% per year.**
2. **Increase petroleum displacement (GGE) by more than 15% per year, on average, by 2027.**

This Master Plan includes policy and fleet strategies designed to realize these goals. The fleet strategies are categorized into three pathways and include 108 opportunities to displace fuel and reduce GHG emissions. Implementing the strategies and opportunities outlined in this Plan may yield substantial economic and environmental benefits for the region. Collectively, these opportunities could result in a net benefit exceeding $104 million and potentially displace 14 million gallons of gas or diesel and reduce GHG emissions by 314 thousand $mtCO_2e$.

To successfully realize its goals, the proposed strategies must be proactively implemented by participating fleets. The timeline for implementation will be a critical factor in determining achievement. Detailed implementation strategies can be found in the subsequent section, offering a roadmap for fleets to actively engage in further alternative fuel adoption. A comprehensive fleet analysis can be found in **Appendix C**.

7 Strategies

This plan includes fleet and policy strategies designed to meet North Florida Clean Fuels Coalition goals over the next decade and beyond. Fleet strategies (Section 7.1) organize into three pathways. Section 7.2 includes policy strategies to integrate clean fleet transitions into capital planning and operations.

Across the three pathways, there are over 100 opportunities for fleets to transition to clean fuels, involving thousands of vehicles.

- **Pathway 1** requires low or no infrastructure investment, and no vehicle modifications or new vehicle purchases. It is the lowest cost pathway. It displaces more fuel than Pathway 2, but has the lowest environmental benefits.
- **Pathway 2** requires low or no infrastructure investment, and investment in vehicle modifications or new vehicles. It is the medium cost pathway, displacing less fuel than Pathway 1 or 3, but providing more environmental benefit than Pathway 1.
- **Pathway 3**: requires investment in both infrastructure and vehicles. It is the highest cost pathway, but it displaces the most fuel and has the highest environmental impact.

Pathway 1 features 30 opportunities for nine fleets to switch from diesel to B20, with infrastructure to support handling it the only investment. For an investment totaling $5.7M and a $39.8M net benefit, these opportunities could displace 15.5M diesel gallons and avoid 110 thousand mtCO_2e of GHG emissions over 15 years.

Pathway 2 includes 47 opportunities for 14 fleets to cost-effectively transition to hybrid electric, propane or CNG vehicles. More investment is required – over $40M for new or modified vehicles – for a net return of $41M. Over 2.8M gas / diesel gallons can be displaced, avoiding 135 thousand mtCO_2e.

Pathway 3 focuses on EVs. It features 60 opportunities for 14 fleets to cost-effectively convert a vehicle to BEVs. Investment costs total $197M and include both new electric vehicles and associated charging infrastructure. Net benefits could be $148M over 12 years, displacing 56M gasoline gallons and avoiding 448 thousand mtCO_2e.

Fleets could opt to begin transitioning to clean fuels for a specific use case (e.g., shuttle buses) on Pathway 1 or 2, then transition to Pathway 2 or 3 over time. Alternatively, fleets could choose to move directly to Pathway 2 or 3.

7.1 Fleet Strategies

7.1.1 Pathway 1 Opportunities

Fleets can focus on "drop-in" fuels when investment in new or retrofitted vehicles is not feasible. Transitioning from diesel to B20 fuel is an opportunity since it can be used in diesel engines without modification. While infrastructure costs are like diesel, since the same tanks, pumps and dispensers can typically be used, B20 fuel traditionally costs slightly less than diesel.

The opportunities outlined in *Table 5* are the most cost-effective opportunities for switching to biodiesel. If implemented, fleet operators could experience a nearly $40 million net benefit and reduce GHG emissions by more than 110 thousand $mtCO_2e$.

Table 5: Pathway 1 Opportunities

Fleet	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
JTA	TRANSIT	Diesel	B20	127	-	179,016	8,723,097	22,627
COJ	REFUSE	Diesel	B20	51	-	200,937	6,517,016	16,985
COJ	FIRE	Diesel	B20	145	-	200,937	5,887,743	15,373
JEA	BUCKET	Diesel	B20	185	-	179,016	3,080,145	8,168
JEA	MDTRUCK-D	Diesel	B20	218	-	179,016	2,143,801	5,728
COJ	DUMP	Diesel	B20	71	-	200,937	1,727,381	4,713
JEA	STRAIGHT	Diesel	B20	83	-	179,016	1,440,135	3,966
SJC	FIRE	Diesel	B20	31	-	200,937	1,170,796	3,287
SJC	FREIGHT	Diesel	B20	31	-	200,937	1,012,178	2,880
JTA	FREIGHT	Diesel	B20	22	-	200,937	903,051	2,601
JEA	FREIGHT	Diesel	B20	27	-	200,937	867,138	2,508
NAC	FIRE	Diesel	B20	21	-	200,937	800,364	2,337
COJ	FREIGHT	Diesel	B20	24	-	200,937	758,358	2,230
NAC	DUMP	Diesel	B20	26	-	200,937	692,070	2,060
COJ	SWEEPER	Diesel	B20	7	-	200,937	622,996	1,883
JEA	DUMP	Diesel	B20	28	-	200,937	613,449	1,858
COJ	STRAIGHT	Diesel	B20	32	-	179,016	489,011	1,529
SJC	STRAIGHT	Diesel	B20	32	-	179,016	489,011	1,529
COJ	SHUTTLE-D	Diesel	B20	30	-	179,016	421,146	1,346
COJ	MDTRUCK-D	Diesel	B20	50	-	179,016	408,644	1,314
CSA	SWEEPER	Diesel	B20	3	-	200,937	203,066	807
CSA	DUMP	Diesel	B20	12	-	200,937	198,979	797
RSP	TRANSIT	Diesel	B20	5	-	179,016	182,290	743
CSA	FREIGHT	Diesel	B20	7	-	200,937	141,938	650
NAC	STRAIGHT	Diesel	B20	9	-	179,016	108,367	554
CSA	FIRE	Diesel	B20	5	-	200,937	95,000	530
COJ	BUCKET	Diesel	B20	10	-	179,016	64,548	442
SAB	REFUSE	Diesel	B20	6	-	200,937	43,392	398
FDB	DUMP	Diesel	B20	5	-	200,937	17,644	332
SJC	DUMP	Diesel	B20	5	-	200,937	17,641	332

Fleet	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
			TOTALS	**1,308**	**-**	**5,786,979**	**39,840,398**	**110,505**

Utilizing biodiesel is a cost-effective option, but it does not eliminate tailpipe emissions and associated localized air pollution. As use cases for EVs expand, with more manufacturers offering medium and heavy-duty models, and costs decreasing, electricity provides the greatest opportunity for diesel displacement and associated GHG reductions. Hydrogen may also be an opportunity in the future, although no cost-effective options are available today. As diesel vehicles are replaced, medium and heavy-duty diesel fleets should evaluate opportunities to transition to electric, and potentially hydrogen options. The North Florida Clean Fuels Coalition is committed to supporting these evaluations using the framework established in this plan.

7.1.2 Pathway 2 Opportunities

Opportunities included in Pathway 2 and outlined in *Table 6* are more varied and include cost-effective transitions to hybrid vehicles, propane, and CNG. While many options included in Pathway 2 provide greater reductions in GHG emissions than Pathway 1, they also require greater investment in vehicles and/or infrastructure. Net benefits total $42M with 3M gas /diesel gallons displaced, and 136 thousand mtCO_2e avoided.

Converting light-, medium- and heavy-duty vehicles to HEVs is a very cost-effective strategy for reducing GHG emissions. HEVs require no new infrastructure and incremental vehicle costs are usually lower than other AFVs. HEVs also provide greater reductions in GHG emissions than other AFVs, except EVs.

Several LPG opportunities for larger vehicles such as medium-duty trucks, utility vans, buses and shuttles are outlined in *Table 6*. Paratransit buses are a use case that can benefit from converting to LPG. This plan currently assesses paratransit fleets serving four counties (Duval, Nassau, Putnam, and St. Johns) and intends to incorporate all paratransit fleets in the future. If paratransit shuttles currently included in this plan transition to LPG, fleet operators could receive a $1.7M net benefit and reduce GHG emissions by 6,404 mtCO_2e.

Four CNG opportunities were identified, all within fleets already using CNG. JTA and the North Florida TPO have previously invested in a CNG transition, including public and private CNG fueling stations located at JTA's Myrtle Avenue campus. Currently, JTA operates 127 CNG buses and intends to procure additional CNG buses in the future. The City of Jacksonville operates 58 refuse trucks, seven of which use CNG from JTA's CNG station. Converting the remaining 51 refuse trucks to CNG was included in Pathway 2. Finally, the St. Johns County fleet includes 173 CNG light-duty and medium-duty trucks and converting the remaining 205 trucks to CNG was included in Pathway 2.

Table 6: Pathway 2 Opportunities

Fleet	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
COJ	POLICECAR	Gasoline	HEV	341	852,500	71,244	14,005,657	25,486
COJ	CAR	Gasoline	HEV	861	2,152,500	71,244	4,491,918	14,709
COJ	POLICESUV	Gasoline	HEV	109	272,500	71,244	4,429,112	7,869
COJ	SUV	Gasoline	HEV	811	2,027,500	71,244	4,180,999	13,768
JTA	TRANSIT	Diesel	CNG	127	6,350,000	770,700	3,019,182	6,932
CSA	POLICESUV	Gasoline	HEV	58	145,000	71,244	2,356,775	4,187
COJ	MDTRUCK	Gasoline	LPG	351	3,510,000	61,584	1,972,869	10,821
COJ	VAN	Gasoline	LPG	101	1,010,000	61,584	1,336,139	4,554
FNF	FREIGHT	Diesel	Diesel HEV	11	206,250	89,055	1,261,546	6,288
JTA	SHUTTLE	Gasoline	LPG	127	1,031,875	61,584	1,161,594	4,268
SJC	REFUSE	Diesel	Diesel HEV	3	187,500	89,055	832,941	7,596
NAC	AMBULANCE	Gasoline	LPG	12	120,000	61,584	785,123	1,709
SJC	SUV	Gasoline	HEV	126	315,000	71,244	649,576	2,139
SJC	VAN	Gasoline	LPG	43	430,000	61,584	589,404	1,967
NAC	MDTRUCK - D	Diesel	LPG	13	(48,750)	61,584	491,286	(64)
SAB	POLICESUV	Gasoline	HEV	11	27,500	71,244	446,975	794
FDB	POLICESUV	Gasoline	HEV	10	25,000	71,244	406,341	722
SBC	SHUTTLE	Gasoline	LPG	47	381,875	61,584	372,567	1,460
NAC	SUV	Gasoline	HEV	48	120,000	71,244	339,287	1,014
FDB	SUV	Gasoline	HEV	37	92,500	71,244	190,748	628
FDB	SCHOOL	Diesel	LPG	2	20,000	61,584	171,845	(23)
JEA	SUV	Gasoline	HEV	29	72,500	71,244	171,010	539
JEA	MDTRUCK	Gasoline	LPG	22	220,000	61,584	164,512	738
CSA	POLICECAR	Gasoline	HEV	4	10,000	71,244	164,289	299
SJC	CAR	Gasoline	HEV	26	65,000	71,244	135,644	444
FDB	POLICECAR	Gasoline	HEV	3	7,500	71,244	123,217	224
RSP	SHUTTLE	Gasoline	LPG	15	121,875	61,584	121,622	459
SJC	SCHOOL	Diesel	LPG	1	10,000	61,584	107,877	(14)
SJC	MDTRUCK	Gasoline	LPG	83	830,000	61,584	99,133	1,850
SAB	SUV	Gasoline	HEV	17	42,500	71,244	87,641	289
SAB	POLICECAR	Gasoline	HEV	2	5,000	71,244	82,145	149
NAC	MDTRUCK	Gasoline	LPG	54	540,000	61,584	67,871	1,204
NCT	SHUTTLE	Gasoline	LPG	7	56,875	61,584	63,710	217
RSP	SHUTTLE-D	Diesel	LPG	1	1,875	61,584	47,171	(7)
NTB	MDTRUCK-D	Diesel	LPG	1	(3,750)	61,584	46,708	(5)
CSA	MDTRUCK	Gasoline	LPG	30	300,000	61,584	42,000	669
FDB	MDTRUCK	Gasoline	LPG	28	280,000	61,584	39,844	624
GCS	LDTRUCK-D	Diesel	LPG	3	(1,875)	61,584	24,876	(2)
NTB	MDTRUCK	Gasoline	LPG	7	70,000	61,584	17,206	156
CSA	STEP	Diesel	Diesel HEV	2	37,500	71,244	17,108	956
CSA	CAR	Gasoline	HEV	11	27,500	71,244	9,544	84
GCS	CAR	Gasoline	HEV	22	55,000	71,244	8,645	146
FNF	STRAIGHT	Diesel	LPG	2	35,000	61,584	7,521	(25)
SJC	LDTRUCK	Gasoline	LPG	122	991,250	61,584	(279,850)	1,460
SJC	MDTRUCK	Gasoline	CNG	83	830,000	770,700	(302,699)	1,896
COJ	REFUSE	Diesel	CNG	51	2,231,250	1,951,456	(1,307,425)	5,203

Fleet	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
SJC	LDTRUCK	Gasoline	CNG	122	1,753,750	770,700	(1,563,111)	1,496
			TOTALS	**3,997**	**27,817,500**	**7,150,150**	**41,688,091**	**135,876**

7.1.3 Pathway 3 Opportunities

Opportunities in Pathway 3 are focused on driving the highest gas / diesel displacement and GHG reduction through the transition to EVs. *Table 7* below summarizes Pathway 3, considering incremental vehicle costs, infrastructure deployment costs, as well as operations and maintenance costs for both vehicles and charging stations. Converting to EVs displaces 55M gas / diesel gallons and avoids 447 $mtCO_2e$ with a $148M net benefit.

Table 7: Pathway 3 Opportunities

Fleet	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
COJ	REFUSE	Diesel	EV	51	12,750,000	840,505	42,019,589	73,148
COJ	POLICECAR	Gasoline	EV	341	4,092,000	2,642,276	38,724,591	45,970
COJ	POLICESUV	Gasoline	EV	109	1,062,750	1,322,188	12,414,888	14,261
JEA	MDTRUCK-D	Diesel	EV	218	10,900,000	1,234,368	11,992,806	19,938
CSA	POLICESUV	Gasoline	EV	58	565,500	1,030,740	6,312,231	7,588
COJ	VAN	Gasoline	EV	101	4,418,750	565,752	6,058,132	19,073
JTA	SHUTTLE	Gasoline	EV	127	4,286,250	720,048	5,898,146	17,876
COJ	SUV	Gasoline	EV	811	7,907,250	4,628,880	4,661,696	24,952
COJ	SHUTTLE-D	Diesel	EV	30	825,000	171,440	4,342,075	4,684
COJ	MDTRUCK	Gasoline	EV	351	22,376,250	2,005,848	3,766,025	45,322
COJ	MDTRUCK-D	Diesel	EV	50	2,500,000	274,304	2,814,355	4,573
SJC	VAN	Gasoline	EV	43	1,881,250	240,016	2,691,285	8,239
COJ	CAR	Gasoline	EV	861	10,332,000	4,920,328	2,642,205	26,530
SBC	SHUTTLE	Gasoline	EV	47	1,586,250	257,160	1,924,126	6,114
JEA	VAN	Gasoline	EV	29	1,268,750	154,296	1,845,823	5,557
SJC	REFUSE	Diesel	EV	3	750,000	840,505	1,764,493	4,303
COJ	SHUTTLE	Gasoline	EV	30	1,012,500	171,440	1,246,639	3,902
JEA	VAN - D	Diesel	EV	9	337,500	51,432	915,730	1,221
SJC	SUV	Gasoline	EV	126	1,228,500	720,048	783,546	3,877
SAB	POLICESUV	Gasoline	EV	11	107,250	756,436	693,929	1,439
RSP	SHUTTLE	Gasoline	EV	15	506,250	85,720	639,900	1,921
NAC	SUV	Gasoline	EV	48	468,000	274,304	598,290	1,863
FDB	POLICESUV	Gasoline	EV	10	97,500	756,436	568,554	1,326
JEA	MDTRUCK	Gasoline	EV	22	1,402,500	120,008	473,402	3,093
NAC	MDTRUCK-D	Diesel	EV	13	650,000	68,576	377,120	877
NCT	SHUTTLE	Gasoline	EV	7	236,250	34,288	351,218	924
FDB	VAN	Gasoline	EV	4	175,000	17,144	320,152	777
FNF	VAN	Gasoline	EV	4	175,000	17,144	313,611	755

Fleet	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
JEA	SUV	Gasoline	EV	29	282,750	154,296	306,495	977
FDB	SUV	Gasoline	EV	37	360,750	205,728	286,127	1,154
NAC	VAN	Gasoline	EV	3	131,250	17,144	274,773	619
JEA	SHUTTLE	Gasoline	EV	2	67,500	17,144	256,460	441
CSA	VAN	Gasoline	EV	3	131,250	17,144	253,639	575
FNF	MDTRUCK-D	Diesel	EV	3	150,000	17,144	235,145	274
FDB	SHUTTLE	Gasoline	EV	3	101,250	17,144	188,784	396
SAB	SUV	Gasoline	EV	17	165,750	85,720	178,778	523
FNF	FREIGHT	Diesel	EV	11	4,812,500	840,505	174,505	15,526
SJC	CAR	Gasoline	EV	26	312,000	137,152	160,310	801
NAC	LDTRUCK	Gasoline	EV	88	2,706,000	497,176	152,654	5,229
CSA	SHUTTLE	Gasoline	EV	2	67,500	17,144	143,889	260
CSA	SUV	Gasoline	EV	10	97,500	51,432	133,491	308
RSP	SHUTTLE-D	Diesel	EV	1	27,500	17,144	127,772	91
SAB	VAN	Gasoline	EV	1	43,750	17,144	120,613	192
NCT	SUV	Gasoline	EV	4	39,000	17,144	99,571	125
NTB	SUV	Gasoline	EV	4	39,000	17,144	99,571	123
NTB	MDTRUCK-D	Diesel	EV	1	50,000	17,144	82,904	66
FNF	CAR	Gasoline	EV	3	36,000	17,144	80,202	92
FNF	SUV	Gasoline	EV	1	9,750	17,144	67,533	34
JEA	CAR	Gasoline	EV	1	12,000	17,144	62,801	31
NAC	CAR	Gasoline	EV	5	60,000	17,144	57,672	98
NCT	LDTRUCK	Gasoline	EV	4	123,000	17,144	55,337	200
FNF	LDTRUCK	Gasoline	EV	1	30,750	17,144	54,470	49
SAB	CAR	Gasoline	EV	2	24,000	17,144	47,753	28
CSA	STEP	Diesel	EV	2	200,000	17,144	45,789	588
GCS	SHUTTLE	Gasoline	EV	1	33,750	17,144	36,283	29
SAB	MDTRUCK	Gasoline	EV	5	318,750	17,144	18,269	467
FDB	CAR	Gasoline	EV	6	72,000	34,288	17,915	84
NAC	SHUTTLE	Gasoline	EV	18	607,500	102,864	14,467	1,134
NTB	LDTRUCK	Gasoline	EV	14	430,500	68,576	6,997	690
JTA	TRANSIT	Diesel	EV	127	63,500,000	720,048	(12,414,126)	66,659
			TOTALS	**3,964**	**168,941,500**	**28,179,439**	**148,581,393**	**447,968**

Table 8 compares gasoline / diesel maintenance costs to EVs. In *Table 8*, “Gasoline/Diesel Vehicle Maintenance, Station O&M” includes gasoline / diesel vehicle and infrastructure maintenance costs. “EV Incremental Vehicle Cost, Vehicle Maintenance, Station O&M” includes EV incremental cost, EV maintenance costs, and charging station maintenance costs. *Table 8* does not include costs of fueling infrastructure for gas / diesel or EVs. *Table 8* shows that for large fleets, EVs higher incremental cost are mostly offset by O&M savings, on average.

Table 8: Cost Comparison of Gasoline/Diesel Vehicles to EVs

Use Case	Gasoline/Diesel Vehicle Maintenance, Station O&M ($ per vehicle)	EV Incremental Vehicle Cost, Vehicle Maintenance, Station O&M ($ per vehicle)	Difference ($ per vehicle)
POLICECAR	212,212	154,007	(58,205)
POLICESUV	217,980	160,236	(57,744)
SHUTTLE	83,201	81,745	(1,456)
VAN	88,684	98,368	9,684
SUV	24,171	27,075	2,904
CAR	23,818	29,122	5,304
LDTRUCK	34,107	54,152	20,045
AVERAGES	**97,739**	**86,386**	**(11,353)**

Fleets converting to electric must also consider charging station procurement, installation, operations and maintenance. Providing charging infrastructure can be challenging, involving a new expense for fleet operations that may require additional outside expertise from the electric utility and electrical contractors.

Charging infrastructure purchase and installation is approximately 13% of total fleet conversion costs. Reducing this cost through grants or incentives, such as those available from the region's electric utilities, and installing conduits and sizing electrical panels for EV chargers as part of on-going capital projects, will make converting fleets to EVs more cost-effective.

Finally, EV technology and manufacturing is rapidly maturing, resulting in accelerating growth in market share. More efficient batteries and faster charging stations are emerging. Many major manufacturers have committed to sunsetting production of internal combustion engines within the next decade. These trends will likely make EVs and associated infrastructure increasingly competitive with gas / diesel and other AFVs during the horizon of this plan.

7.2 Policy Strategies

To support a successful transition to alternative fuel fleet vehicles, fleets must cooperate across their organizational boundaries to support efficient fueling infrastructure development, promote safety, and foster expert operations and maintenance practices. Policies and best practices focused on vehicle procurement, infrastructure development, and training can be incorporated into fleets' organization framework. The North Florida Clean Fuels Coalition is committed to working with fleets to enable their transition to clean fuels:

- **Fleet Procurement**
  - **Policy:** Conduct a full life cycle assessment of replacement vehicle purchases like the one used in this plan. This analysis should consider environmental and social benefits. In addition, it should include all available funding opportunities and rebates.

- **Infrastructure:**

- **Policy:** Fill infrastructure gaps along major corridors to improve mobility of alternative fuel vehicles.
- **Best Practice:** Collaborate with stakeholders, such as Florida Department of Transportation District 2, to influence the allocation of National Electric Vehicle Infrastructure (NEVI) Formula funding.
- **Policy:** Require all new construction or renovations include EV infrastructure. Municipalities such as Atlanta, Charlotte, and Orlando have adopted EV charging ordinances to promote proper infrastructure planning. EV ordinances and policies can require a percentage of parking spaces include EV charging stations, or require they be "EV-Ready," which involves installing necessary electrical conduit and ensuring adequate capacity at the electrical panel.
- **Policy:** Develop EV charger specifications with minimum performance requirements, such as networking capabilities, industry standards compliance, connector type, wattage, etc. to assure standardization of assets and functionalities. Consider integration and compatibility with existing telematics platforms for range optimization and charging/refueling forecasting.
- **Best Practice:** Take advantage of existing or planned capital projects. If re-paving a parking lot or installing EV Charging Stations, install conduits and size electrical panels for additional EV-Chargers to minimize future disturbance and cost.
- **Best Practice:** Engage regional electric utilities to identify potential funding, incentives, or rebate programs available to supplement the cost of infrastructure development. Currently JEA and FPL offer attractive EV infrastructure programs.
- **Best Practice:** When evaluating charging and fueling infrastructure projects, assess options for third-party financed, owned, and operated systems. Much of the region's CNG and LPG infrastructure has been developed via these alternative delivery methods.
- **Best Practice:** When installing CNG or LNG fuels infrastructure, ensure all proper ventilation, leak sensors, and alarms are included in all design documents.

- **Training:**
  - **Best Practice:** Develop or partner with local technical schools on maintenance training for alternative fuel vehicles and charging stations for all maintenance technicians.
  - **Policy:** Develop operational policies for all clean fuel fleet vehicle types that address refueling/charging requirements, range restrictions, operator limitations, etc.
  - **Best Practice:** Develop training modules for all staff on the proper operation, refueling/charging, and safety protocols for alternative fuel vehicles.
  - **Best Practice:** While electric vehicles are not more likely to catch fire than internal combustion engines, battery fires are handled differently than internal combustion engine fires. Develop specific training for Fire and First Responders on proper protocols and procedures for safely addressing battery fires.

8 Appendices

Appendix A – Funding Review

Clean fuels adoption and infrastructure growth are critical to developing resilience in North Florida. This Clean Fuels Master Plan was established as a response to various state and federal pressures for increased adaptative capacity and change in the transportation industry. At the federal level, the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (Act) have led to substantial investments in infrastructure. Additionally, Executive Order 14008 ensures that 40% of specific federal investments benefit marginalized, underserved, and pollution-burdened communities, addressing underinvestment and providing critical resources to communities affected by remnant pollution and environmental hazards. At the state level, effective July 1, 2023, Senate Bill 284 requires municipal fleets to procure vehicles based on lowest lifetime ownership costs. These legislative actions serve to propel change in various ways from providing funding opportunities to enacting regulatory standards and requirements.

A.1 Federal Level

Federal funding supports programs and services related to alternative fuels and alternative fuel vehicles (AFVs), contributing to national energy security and emissions reduction efforts. Historically, the Clean Air Act of 1970 and the Energy Policy and Conservation Act of 1975 laid the foundation for regulations on mobile source pollution and alternative fuel programs. Multiple acts, including the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 and the Consolidated Appropriations Act of 2016, later amended in 2020 and 2021, extended alternative fuel tax credits. Consistency in federal funding encourages innovation, fosters economic growth, and makes the nation's fleet more diversified, resilient, and less susceptible to fuel price volatility.

Infrastructure Investment and Jobs Act (IIJA)

The Infrastructure Investment and Jobs Act (IIJA) (Public Law 117-58) was signed into law in 2021. Formerly known as the Bipartisan Infrastructure Bill (BIL), this Act provides a $550 billion dollar investment to address new and existing infrastructure needs including alternative fuel accessibility and public transportation, over the fiscal years 2022 to 2026. Notably, the BIL established highway programs that contain $350 billion , with most apportioned to the states, where funds may be administered by Departments of Transportation, Metropolitan Planning Organizations (MPOs), and local governments to fund transportation projects and activities.

National Electric Vehicle Infrastructure Formula Program

The IIJA sets aside $7.5 billion in federal funding for electric vehicle (EV) infrastructure. To allocate this funding to the states, the National Electric Vehicle Infrastructure (NEVI) Formula Program was established to facilitate an accessible and reliable interconnected EV charging network. The NEVI program will provide approximately $198 million in funding opportunities to the Florida Department of Transportation (FDOT) from fiscal year (FY) 2022-2026) to address EV needs for passenger vehicles and light duty trucks. NEVI funded qualifying projects include the following:

- EV charging infrastructure installation
- Operating and maintenance expenses
- Traffic control device purchase and installation in the right-of-way
- On-premises signage
- Mapping and analysis activities

EV charging infrastructure funded by NEVI must be:

- open to the public or authorized commercial vehicle operators from more than one company
- located along the designated Alternative Fuel Corridor,
- prioritized along the Interstate Highway System
- a maximum of 50 miles distance between location
- able to meet power capabilities
- empower rural, underserved, and disadvantaged communities
- ideally locations with publicly available restrooms, appropriate lighting and sheltered seating areas

The Electric Vehicle Infrastructure Deployment Plan (Plan) was developed by the United States Department of Transportation (USDOT) and approved by the Federal Highway Administration (FHWA) September 14, 2022, as a framework to implement the NEVI program at the federal, state, and local level. This document supports the existing Florida Transportation Plan (FTP) and the state's Electric Vehicle Infrastructure Master Plan (EVMP), which lists the following objectives:

- Support electric vehicles for short- and long-range travel
- Encourage EV expansion in the state
- Increase EV charging access along evacuation routes in the state

The Plan will support Florida's NEVI program implementation, alongside the FTP and EVMP, by guiding EV infrastructure funding and investment over the NEVI Program timeline.

Clean School Bus Program

Funding from the IIJA provided the EPA with $5 billion from FY 2022-2026 to replace existing school buses with zero-emission and low emission models. The Clean School Bus Program's goal is to deliver cleaner air for communities across the country through an annual lottery system. As of FY 2022, $1 billion had been allocated to 389 school districts across the nation to purchase electric and low-emissions school buses. Applicants requesting to replace school buses that serve prioritized school districts will receive increased funding per bus and will be given priority during the selection process. Priority consideration is granted to applications originating from high-needs local educational agencies, rural school districts, school districts funded by the Bureau of Indian Affairs, and those receiving basic support payments for students living on Indian land. Duval County's prioritized school district has requested 25 EV school buses through this program.

Inflation Reduction Act

The Inflation Reduction Act (Act), a bill designated to stimulate the economy through clean energy and climate action, was signed into law August 16, 2022, by President Biden. Through tax provisions, grants, and loans, the Act serves to accelerate alternative fuel vehicle use, among other initiatives. The Act complements the IIJA as they both strengthen investments in clean energy solutions and include numerous funding opportunities for agencies to finance and deploy clean energy technologies. The Building a Clean Energy Economy Guidebook highlights grants and loans that will advance the transition to clean fuels:

- Greenhouse Gas (GHG) Reduction Fund: Through this Act, the Environmental Protection Agency (EPA) received $27 billion to develop clean energy and fund climate projects that reduce GHG emissions. Projects benefiting low-income and disadvantaged communities are prioritized.
- Energy Infrastructure Reinvestment (EIR) Program: The Act provides up to $250 billion in guaranteed loans to projects which repair, repurpose, or replace energy infrastructure that has ceased operations. Alternatively, loans can also be used to develop infrastructure, which avoids, reduces or sequesters GHG emissions.

Consumer incentives are a major focus, especially for clean fuels vehicles. The Act expands access to tax credits by allowing credits to be transferred to unrelated parties in exchange for cash or reduced AFV price at the point of sale. The state funding opportunities included in the Act are highlighted below:

- Commercial Clean Vehicles Credit: The Act will help offset up to 30% of expenses to transition a conventional gas commercial vehicle to an electric vehicle. In cases where consumers opt for cleaner fuels without going fully electric, they may still qualify for a tax credit of up to 15%.
- Alternative Fuel Vehicle Refueling Property Credit: Through the Act, this tax credit provides individuals up to $1,000 for refueling alternative fuel vehicles, while businesses can obtain up to $100,000 in credits for charging infrastructure in low-income and rural regions.
- Clean Heavy-Duty Vehicle Program: Supported by the Act and implemented by the EPA, this program invests $1 billion to support tribal, state and local governments replacing heavy-duty Class 6 and 7 commercial vehicles and transitioning to zero-emissions vehicles. This program

emphasizes $400 million in workforce development, infrastructure improvements, and investment for areas not fulfilling national air quality standards.

A.2 State Level

Florida's state regulations, incentives, and funding initiatives are actively reducing emissions. FDOT and Florida Department of Environmental Protection (FDEP) support federal funding allocation, program implementation, and executing state laws. The IIJA introduced the NEVI Formula Program in which the Federal Highway Administration (FHWA) issued initial NEVI Formula Program Guidance in 2022, providing vital information and funding eligibility for an equitable national EV charger network. The NEVI Formula Program mandates each state to provide an annual plan for EV infrastructure deployment. In addition, Florida Statute 339.287 requires that the FDOT collaborate with the FDEP, the Florida Public Service Commission (PSC), and other state agencies to create Florida’s Electric Vehicle Infrastructure Master Plan for EV charging station expansion along the State Highway System (SHS).

Diesel Emissions Mitigation Program

The FDEP administers the Diesel Emissions Mitigation Program (DEMP) to mitigate diesel emissions from mobile sources, and provides funding from the Volkswagen Settlement and Diesel Emissions Reduction Act (DERA). Under Final Trust Agreement terms, all states are eligible to become beneficiaries under the Environmental Mitigation Trust Agreement for State Beneficiaries, which provides money for specified diesel emission reduction projects to offset excess NOx emissions caused by the subject 2.0-liter and 3.0-liter vehicles. As a Mitigation Trust Fund beneficiary, Florida is required to develop and submit a comprehensive Mitigation Plan to the trustee before fund distribution, ensuring proper accountability and effective resource utilization for mitigating diesel emissions in the state. Florida’s share is more than $166 million, or 5.68% of the overall Mitigation Trust Fund.

The DEMP leverages resources from the Volkswagen Settlement and the EPA’s DERA. Volkswagen reached a settlement with the U.S. government, committing approximately $16 billion in funding to resolve allegations of selling diesel engines equipped with defeative devices that violated the Clean Air Act. Florida’s $166 million trust is the combined amount from the 2.0-liter settlement of $152.4 million and from the 3.0-liter settlement of $12.9 million. Available funds are used to enhance human health and improve air quality by reducing harmful emissions from diesel engines.

Electric Transit Bus Grant Program

In August 2022, the FDEP launched the Electric Transit Bus Grant Program, an initiative under DEMP, to reduce air pollutants from diesel emissions and improve Florida's air quality. To facilitate the transition, a Notice of Available Funding (NOFA) was released to support the electric transit bus purchases to replace eligible diesel transit vehicles.

Participating public transit agencies are required to acquire two electric transit buses for each bus being replaced. If eligible agencies are unable to meet this requirement, they may participate with a prorated portion of the award. With the Volkswagen settlement, the FDEP has granted over $68 million to procure 227 electric transit buses in 13 counties, including Duval County, to replace existing diesel transit buses.

A.3 Local Level

Local governments have the potential to provide financial support allocated through state and federal programs to incentivize local transportation system electrification. Under Florida Statute 163.08, local funding is made available to property owners within the jurisdiction, aiding them in financing EV charging stations installation. Notably, the North Florida Clean Fuels Coalition, designated by the U.S. Clean Cities program in 2016, focuses on conserving energy and advancing domestic fuels and cutting-edge vehicle technologies. Additionally, public and private entities embrace alternative fuels, innovative vehicles, and strategies that curtail fuel consumption while enhancing fuel efficiency.

North Florida Transportation Planning Organization – Clean Fuels Coalition

The North Florida Clean Fuels Coalition collaborates closely with vehicle fleets, fuel suppliers, community leaders, affiliated agencies, and other stakeholders. Their joint efforts secure funding to implement federal, state, and local programs that drive clean fuels expansion in North Florida. Prior funded endeavors include constructing the new mid-duty bi-fuel Compressed Natural Gas (CNG) fleet stations in St. Johns County, establishing the Jacksonville Transportation Authority (JTA) CNG station, procuring new Liquified Natural Gas (LNG)-equipped locomotives and fuel cars for the Florida East Coast Railway pilot project, installing regional EV charging stations in collaboration with JEA, and covering CNG equipment expenses for new CNG sanitation trucks in the City of Jacksonville.

JEA Drive Electric Funding

JEA aims to encourage the EV use within the Jacksonville community. The Electrification Rebate Program provides consultations, education and incentives to purchase or lease commercial EVs and EV charging stations, with eligibility for acquisitions and installations between October 2019 and September 2025.

Florida Power & Light

Florida Power and Light (FPL), a NextEra Energy subsidiary, serves the majority of Florida's eastern coastline, excluding Jacksonville. FPL launched the FPL EVolution program in 2019 to promote adopting transportation electrification throughout communities in Florida.

EVolution Commercial

FPL presents the FPL EVolution Commercial initiative, in which they supply and oversee direct current fast charging EV stations on commercial premises at zero expense to the property proprietor. The package covers equipment, installation, and maintenance, while users cover the charging costs, ensuring the property owner's electricity bill remains unaffected.

EVolution Fleet

FPL also introduce the FPL EVolution Fleet initiative, which extends services to fleets for assessing opportunities in electrification. They offer the provision, creation, installation, operation, maintenance, and reporting dashboard of fleet EV charging stations for a predetermined monthly charge.

Appendix B – Methodology

The fleet opportunities in this plan derive from data supplied by fleets. Requests for data on fleet assets, operating expenses, fuel usage, and transportation polices were sent via email to 38 organizations in North Florida including municipalities, transportation organizations, utility providers, and nonprofits.

Analysts reviewed the collected data for quality and consistency, and each asset was sorted into one (1) of 19 different use cases. See *Table 9* for descriptions of each use case. Assets not included in this study were categorized as Other/Off-Road. The use cases implemented in this analysis align with vehicle and vocation types in the Department of Energy's Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) tool, which was used to calculate the environmental and economic costs for each use case.

Table 9: Use Case Descriptions and Codes

Use Case	Code	Description
Light-Duty, Passenger Car	CAR	Passenger car
Light-Duty, Police Car	POLICECAR	Passenger car used by law enforcement
Light-Duty, Passenger Pickup Truck	LDTRUCK	Passenger ½ ton truck (e.g., F-150)
Light-Duty, SUV	SUV	SUV and minivans
Light-Duty, Police SUV	POLICESUV	SUV assigned used by law enforcement
Light Commercial, Ambulance	AMBULANCE	Medically equipped vehicle that transports patients
Light Commercial, Medium-Duty Pickup Truck	MDTRUCK	Passenger ¾ ton truck (e.g., F-250)
Light Commercial, Utility Cargo Van	VAN	Utility van used for commercial purposes
Light Commercial, Shuttle/Transit Vans	SHUTTLE	Shuttle or passenger van used to transport passengers
Medium-Duty, Delivery Step Vans	STEP	Delivery truck or walk-in van
Medium-Duty, Straight Truck	STRAIGHT	Commercial truck with customizable body (e.g., box trucks)
Medium-Duty, School Bus	SCHOOL	Bus used to transport students or groups
Medium-Duty, Transit Bus	TRANSIT	Bus used for public transport services
Heavy-Duty, Bucket/Aerial Truck	BUCKET	Utility truck fitted with a hydraulic pole (boom) that has a man-carrying bucket
Heavy-Duty, Dump Truck	DUMP	Truck often used to transport construction waste
Heavy-Duty, Fire Engine	FIRE	Vehicle used as a firefighting apparatus
Heavy-Duty, Freight Truck	FREIGHT	Truck with a powerful engine used to transport materials
Heavy-Duty, Refuse Truck	REFUSE	Truck specially designed to collect and transport solid waste
Heavy-Duty, Street Sweeper	SWEEPER	Truck body that includes a vacuum and is used to clean streets
Other/Off-Road		Assets not included in analysis (e.g., motorcycles, off-road)

After categorizing the submitted fleet data, the AFLEET tool was used to analyze use cases for each fleet. The AFLEET tool calculates the environmental and economic costs associated with various fuels. This analysis considered nine alternatives to gasoline and diesel, including hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), diesel hybrid electric vehicles (Diesel HEV), electric vehicles (EV), biodiesel (B20), compressed natural gas (CNG), liquefied natural gas (LNG), propane (LPG), and ethanol (E85). However, not every alternative was considered for every use case. For example, biodiesel was not considered for light-duty passenger cars.

The AFLEET tool is highly customizable with multiple inputs, but this study focused on nine specific inputs, which are listed in *Table 10*. These inputs were selected for their importance in providing meaningful results and availability of consistent data across fleets.

Table 10: AFLEET Inputs and Data Source

AFLEET Input	Data Source
State	All fleets located within Florida
County	County where fleet is located and primarily operates
Vehicle Type	Based on make, model and other details provided by fleets
Vocation Type	Based on make, model and other details provided by fleets
Number of Vehicles	Calculated based on data provided by each fleet
Annual Vehicle Miles Traveled (VMT)	Six fleets provided annual VMT. The annual VMT for the remaining fleets was calculated using the average of submitted data for similar vehicle types. AFLEET defaults were used if a representative average could not be calculated.
Purchase Price	Many AFLEET default vehicle pricing assumptions are based on outdated estimates. The vehicle market has experienced significant volatility over the past five years due to supply chain disruptions, challenges arising from the COVID-19 pandemic, and shifts in demand trends. To address this, a current vehicle prices assessment was conducted to establish a consistent and precise method for updating the tool’s estimations. A uniform inflation rate of 25% was applied to all vehicles, except for light-duty EV vehicles because the price of those vehicles has gone down due to advancements in technology.
Fuel Price	AFLEET defaults were used for electricity and diesel exhaust fluid (DEF). All other fuel pricing was updated using the national averages from the Alternative Fuels Data Center (AFDC) Alternative Fuel Price Report, October 2023.
Years of Planned Ownership	All Light-Duty, Light-Commercial, and Medium-Duty vehicles were analyzed with 12 years of planned ownership. Heavy-Duty vehicles were analyzed with 15 years of planned ownership. These defaults were determined after reviewing policies and data provided by several fleets.

Information on fuel prices was not available across fleets. Except for electricity and diesel exhaust fluid (DEF), the default AFLEET fuel prices were updated using the most recent national averages from the Alternative Fuels Data Center (AFDC) Alternative Fuel Price Report (October 2023).

Table 11: Fuel Price Defaults

Fuel	Unit	Price
Gasoline	Gasoline Gallon	$3.75
Diesel	diesel Gallon	$4.38
Electricity*	kWh	$0.12
B20	B20 Gallon	$3.66
E85	E85 Gallon	$3.26
Propane	LPG Gallon	$2.21
CNG	CNG GGE	$2.71
LNG	LNG DGE	$2.24
Diesel Exhaust Fluid (DEF)*	DEF Gallon	$2.80

**AFLEET default*

The cost to purchase, install and operate fueling stations varies greatly, which can have a significant impact on each fuel type's cost-effectiveness. Infrastructure costs were included in calculating a more reliable comparison between each fuel type.

Determining the actual cost to install and operate fueling infrastructure for each fleet was outside the scope of this study, so assumptions were used when estimating infrastructure costs. The estimated costs to install and operate fueling infrastructure are based on AFLEET defaults, see *Table 12* for details. The station cost includes the purchase and installation of equipment, which is a one-time expense. Annual operation and maintenance (O&M) costs were extended over the years of planned ownership of the associated asset.

Table 12: Infrastructure Defaults

Fuel	Infrastructure Type	Station Cost ($)	O&M Cost ($)	Fleet Requirements
Gasoline/Diesel	Private Station	-	5,937	1 per fleet
HEV/Diesel HEV	Private Station	-	5,937	1 per fleet
EV/PHEV	Level 2: Curbside (dual port)	9,500	637	1 for every 3 vehicles
EV/PHEV (Police, Ambulance, Heavy Duty)	DC Fast: 150 kW	163,000	45,167	1 per fleet
E85	Private Station	99,426	7,954	1 per fleet
B20	Private Station	91,332	7,307	1 per fleet
LPG	Private Station	78,959	5,132	1 per fleet
CNG	Fast Fill	988,081	64,225	1 per fleet
LNG	Private Station	190,521	12,384	1 per fleet

The analysis assumes each use case within a fleet only requires one fueling station per fuel type, except for EV chargers. The number of EV chargers for light-duty vehicles was assumed to be one for every three vehicles. An additional DC fast charger was added to use cases that include emergency vehicles (e.g., ambulances). The number of EV chargers for heavy-duty vehicles was assumed to be one DC fast charger per fleet.

It was also assumed that fleets currently own and operate private gasoline and/or diesel fueling stations. Therefore, station cost was not included when calculating the infrastructure costs for these fuels, but O&M for the lifetime of the asset was included. Both St. Johns County and JTA have operational CNG fueling stations, so the station cost was removed from calculations when determining the infrastructure costs of CNG for these fleets, but O&M costs were included.

Assuming each use case within a fleet would require a dedicated fueling station results in overestimated infrastructure costs. Furthermore, large fleets can achieve economies of scale, especially when installing a large network of EV chargers. Fleets should consider these factors as they plan transitions to clean fuels.

The AFLEET tool quantifies environmental and economic costs and benefits for multiple scenarios. For example, a light-duty gasoline passenger car base case could have up to six alternative scenarios including EV, PHEV, EV, E85, LPG, and CNG. Economic costs include infrastructure, vehicle purchase price, fuel, maintenance and repair, insurance, and depreciation. The costs are summed and represented as annual cash flow, which is discounted using a 1.89% discount factor resulting in a discounted cash flow over the lifetime of the asset. The present value for each scenario is the total discounted cash flow over the lifetime of the asset.

The data provided by the AFLEET tool can be used to compare the base case (gasoline or diesel) environmental and economic costs and benefits to applicable alternatives. Net benefit (or cost) was calculated as the difference between the base case's present value and each alternative's present value. In addition to net benefit / cost, reduction in GHG emissions, or GHG abatement, is calculated by comparing GHG emissions for each alternative to the base case.

The last step determines the priority of each scenario by comparing the net benefit / cost and cost-effectiveness in reducing GHG emissions of each scenario. Cost-effectiveness is determined by dividing an alternative's GHG abatement by the total required investment. Scenarios are prioritized in four categories (*Table 13*).

Table 13: Priority Ranking Descriptions

Priority	Description
GREEN	Provide a positive net benefit and are among the 15% most cost-effective strategies for reducing GHG emissions.
YELLOW	Provide a positive net benefit and are among the 25% most cost-effective strategies for reducing GHG emissions.
ORANGE	Provide a positive net benefit.
RED	Provide a negative net benefit.

Appendix C – Fleet Analysis

Data requests were sent via email to 38 organizations in North Florida and data was received from 15 organizations for a total of 8,356 assets. Most assets currently use either gasoline (60%) or diesel (28%) while 12% or 806 of the assets included in this study are currently using an alternative fuel. The most common alternative fuel is E85, followed by CNG. Other/Off-Road assets represent 21% of all submitted assets, and while outside the scope of this study, these assets present future opportunities for fuel displacement.

Figure 10: Vehicle Class of Existing Fleet

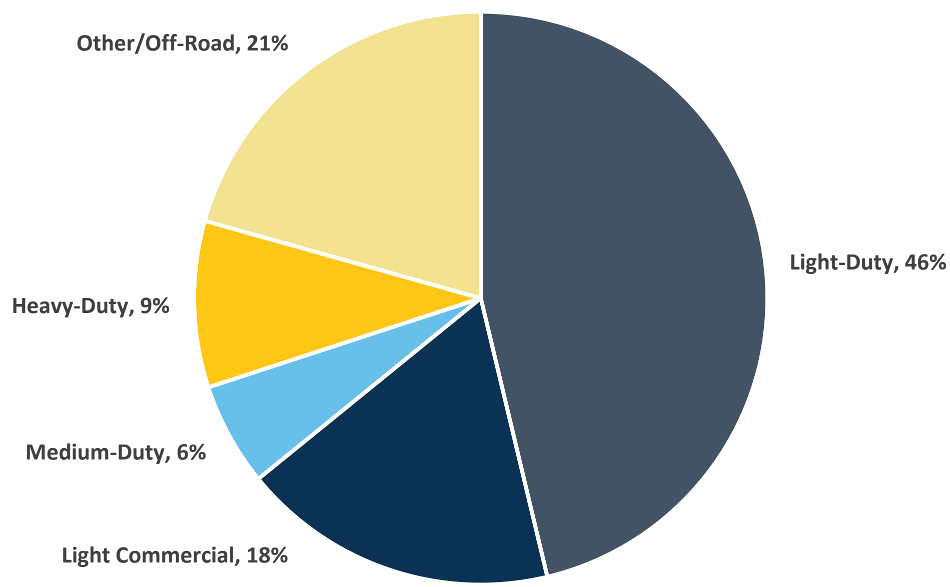
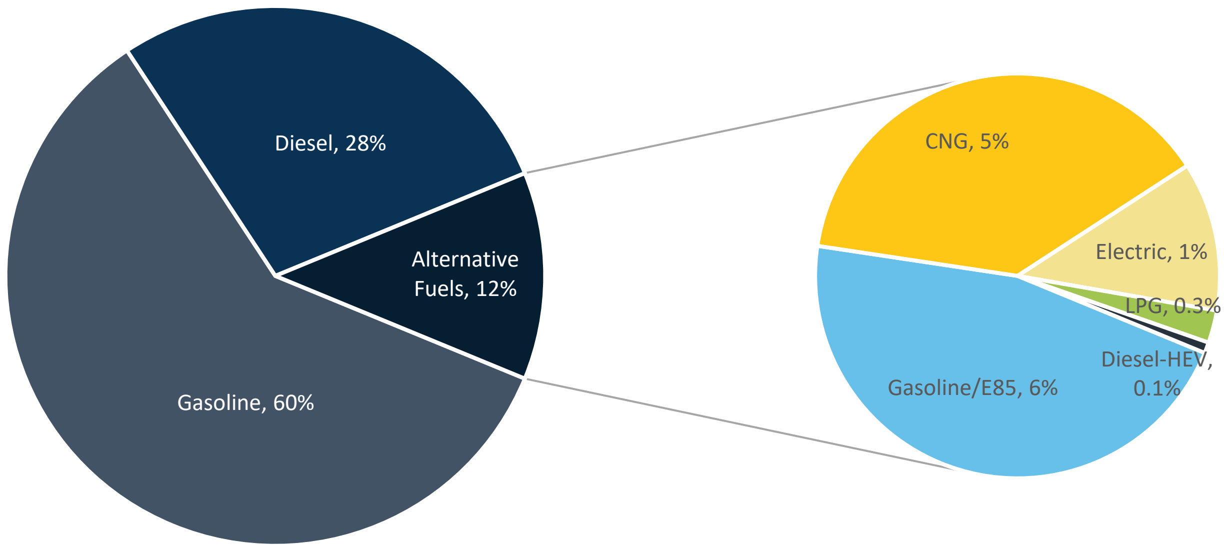


Figure 11: Fuel Type for Existing Fleet Assets



The total number of assets included in this analysis after removing assets categorized as Off-Road, Other, and Undetermined is 6,634. The City of Jacksonville is the largest fleet included in this study with 3,461 assets or 52% of all assets analyzed. The second largest fleet is JEA with 1,127 assets, followed by St. Johns County with 680 assets. The smallest fleet included in this study is NassauTRANSIT which only submitted data on 15 assets. See *Table 14* for details on each fleet included in this study.

Table 14: Submitted Fleet Data

Organization	Light-Duty	Light-Commercial	Medium-Duty	Heavy-Duty	Total
City of Jacksonville	2,552	562	32	315	3,461
JEA	403	401	83	240	1,127
St. Johns County	389	187	33	71	680
JTA	-	127	263	22	412
Nassau County	141	100	9	50	300
City of St. Augustine	123	35	5	35	198
Fernandina Beach	87	35	4	10	136
Green Cove Springs	68	1	3	18	90
St. Augustine Beach	49	6	1	8	64
Sunshine Bus Co. (St. Johns County)	-	-	47	-	47
Neptune Beach	18	8	-	4	30
Feeding Northeast Florida	5	7	1	12	25
Orange Park	25	-	-	-	25
Ride Solution (Putnam County)	-	18	6	-	24
NassauTRANSIT	8	7	-	-	15
Total	**3,868**	**1,494**	**487**	**785**	**6,634**

The following sections will review the recommended alternatives for each fleet in detail.

City of Jacksonville

The City of Jacksonville (COJ) has a diverse and growing population. In 2021, the estimated population was approximately 950,000, making it the most populous city in Florida and the 12th most populous city in the United States. The COJ is also the largest city by area in the contiguous United States, covering 975 square miles, which has a significant impact on vehicle miles traveled and fuel usage.

The COJ has been active in recent years developing resilience scenarios to address climate change impacts, such as flooding and storm surge. The city has advanced its commitment to environmental protection by appointing a Chief Resilience Officer and Sustainability Manager.

Although the North Florida TPO has previously made substantial investments to convert refuse trucks owned and operated by the COJ to CNG, the city's current focus is to convert its fleet to electric.

Fleet Description

The COJ submitted data for 3,862 assets, the largest fleet included in this study. 3,454 assets representing 17 use cases were included in the analysis. Passenger cars were the largest use case with 861 vehicles or 24.8% of the entire fleet, followed by SUVs.

Recommendations

The analysis indicates the COJ fleet can benefit from several alternative fuels. Implementing all identified scenarios may result in a net benefit of $49M and reduce GHG emissions by approximately 134K mtCO_2e.

This analysis indicates several potential scenarios for reducing GHG emissions through electric and hybrid vehicles. The analysis typically favored hybrid-electric vehicles due to the lower investment cost. The cost of installing and operating charging infrastructure for a large fleet such as the COJ would likely be several million dollars. However, it is important to note the cost estimates in this analysis are likely higher than real-world costs due to economies of scale. Hybrid-electric vehicles were the most cost-effective strategy for cars, SUVs, and police vehicles.

The most cost-effective strategy for heavy duty and other diesel vehicles is switching to B20 fuel, which does not require modifications to the existing vehicle. However, using B20 at scale may lead to installing a dedicated B20 fueling station.

COJ owns and operates seven CNG refuse trucks, currently fueled at a station owned by the Jacksonville Transportation Authority (JTA). While this analysis shows B20 as the most cost-effective strategy for reducing GHG emissions, converting the remaining refuse trucks to CNG is also feasible. COJ may consider replacing diesel refuse trucks with CNG trucks as they reach their end-of-life.

Propane is the most cost-effective strategy for utility vans, medium-duty trucks, and light-duty passenger trucks; however, it has a lower priority due to costs associated with converting the trucks to LPG.

Table 15: City of Jacksonville Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	10	-	179,016	64,548	442
	BUCKET	Diesel	LNG	10	625,000	339,129	(1,207,112)	34
	BUCKET	Diesel	CNG	10	750,000	1,758,781	(2,587,516)	135
	BUCKET	Diesel	EV	10	2,500,000	51,432	(2,681,538)	2,064
	CAR	Gasoline	HEV	861	2,152,500	71,244	4,491,918	14,709
	CAR	Gasoline	EV	861	10,332,000	4,920,328	2,642,205	26,530
	CAR	Gasoline	PHEV	861	1,722,000	4,991,572	2,569,867	17,168
	CAR	Gasoline	E85	861	-	194,874	(3,251,456)	14,366
	CAR	Gasoline	LPG	861	6,457,500	61,584	(3,835,278)	5,808
	DUMP	Diesel	B20	71	-	200,937	1,727,381	4,713
	DUMP	Diesel	LNG	71	4,437,500	376,281	(7,043,985)	367
	DUMP	Diesel	CNG	71	5,325,000	1,951,456	(7,543,892)	1,444
	DUMP	Diesel	EV	71	17,750,000	840,505	(16,683,917)	20,830
	FIRE	Diesel	B20	145	-	200,937	5,887,743	15,373
	FIRE	Diesel	CNG	145	10,875,000	1,951,456	(14,939,057)	4,709
	FIRE	Diesel	LNG	145	9,062,500	376,281	(18,461,964)	1,199
	FREIGHT	Diesel	B20	24	-	200,937	758,358	2,230
	FREIGHT	Diesel	Diesel HEV	24	450,000	89,055	(311,613)	3,542
	FREIGHT	Diesel	LNG	24	900,000	376,281	(1,166,213)	1,106
	FREIGHT	Diesel	CNG	24	1,200,000	1,951,456	(2,071,740)	1,587
	FREIGHT	Diesel	EV	24	10,500,000	840,505	(10,449,162)	8,745
	LDTRUCK	Gasoline	LPG	430	3,493,750	61,584	(1,102,819)	4,972
	LDTRUCK	Gasoline	EV	430	13,222,500	2,451,592	(2,247,392)	21,205
	LDTRUCK	Gasoline	E85	430	-	194,874	(2,801,555)	12,300
	LDTRUCK	Gasoline	CNG	430	6,181,250	1,758,781	(4,852,562)	5,094
	LDTRUCK	Gasoline	B20	430	3,762,500	179,016	(8,030,792)	10,312
	MDTRUCK	Gasoline	LPG	351	3,510,000	61,584	1,972,869	10,821
	MDTRUCK	Gasoline	EV	351	22,376,250	2,005,848	3,766,025	45,322
	MDTRUCK	Gasoline	CNG	351	3,510,000	1,758,781	2,072,891	11,086
	MDTRUCK	Gasoline	E85	351	-	194,874	(5,951,785)	26,769
	MDTRUCK	Gasoline	B20	351	4,826,250	179,016	(11,964,158)	22,442
	MDTRUCK-D	Diesel	B20	50	-	179,016	408,644	1,314
	MDTRUCK-D	Diesel	EV	50	2,500,000	274,304	2,814,355	4,573
	MDTRUCK-D	Diesel	LPG	50	(187,500)	61,584	2,494,679	(342)
	MDTRUCK-D	Diesel	CNG	50	(187,500)	1,758,781	1,053,496	(304)
	POLICECAR	Gasoline	EV	341	4,092,000	2,642,276	38,724,591	45,970
	POLICECAR	Gasoline	HEV	341	852,500	71,244	14,005,657	25,486
	POLICECAR	Gasoline	PHEV	341	2,983,750	2,713,520	14,706,731	32,225
	POLICECAR	Gasoline	LPG	341	2,557,500	61,584	2,591,916	10,063
	POLICECAR	Gasoline	CNG	341	2,983,750	1,758,781	2,109,452	10,309
	POLICECAR	Gasoline	E85	341	-	194,874	(5,543,287)	24,893
	POLICECAR	Gasoline	B20	341	2,983,750	179,016	(34,135,227)	20,869
	POLICESUV	Gasoline	HEV	109	272,500	71,244	4,429,112	7,869
	POLICESUV	Gasoline	EV	109	1,062,750	1,322,188	12,414,888	14,261
	POLICESUV	Gasoline	PHEV	109	1,294,375	1,393,432	3,956,259	10,378

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	POLICESUV	Gasoline	LPG	109	817,500	61,584	902,387	3,344
	POLICESUV	Gasoline	CNG	109	1,703,125	1,758,781	(1,187,969)	3,426
	POLICESUV	Gasoline	E85	109	-	194,874	(1,924,570)	8,272
	POLICESUV	Gasoline	B20	109	953,750	179,016	(11,184,167)	6,935
	REFUSE	Diesel	Diesel HEV	51	3,187,500	89,055	14,159,989	129,140
	REFUSE	Diesel	B20	51	-	200,937	6,517,016	16,985
	REFUSE	Diesel	EV	51	12,750,000	840,505	42,019,589	73,148
	REFUSE	Diesel	CNG	51	2,231,250	1,951,456	(1,307,425)	5,203
	REFUSE	Diesel	LNG	51	1,593,750	376,281	(7,588,571)	1,324
	SHUTTLE	Gasoline	EV	30	1,012,500	171,440	1,246,639	3,902
	SHUTTLE	Gasoline	LPG	30	243,750	61,584	241,303	932
	SHUTTLE	Gasoline	E85	30	-	194,874	(625,432)	2,305
	SHUTTLE	Gasoline	B20	30	187,500	179,016	(708,186)	1,932
	SHUTTLE	Gasoline	CNG	30	375,000	1,758,781	(1,441,724)	955
	SHUTTLE-D	Diesel	B20	30	-	179,016	421,146	1,346
	SHUTTLE-D	Diesel	EV	30	825,000	171,440	4,342,075	4,684
	SHUTTLE-D	Diesel	LPG	30	56,250	61,584	1,990,366	(350)
	SHUTTLE-D	Diesel	CNG	30	187,500	1,758,781	414,811	(311)
	STRAIGHT	Diesel	B20	32	-	179,016	489,011	1,529
	STRAIGHT	Diesel	LPG	32	560,000	61,584	(24,570)	(398)
	STRAIGHT	Diesel	LNG	32	1,200,000	339,129	(271,116)	759
	STRAIGHT	Diesel	Diesel HEV	32	600,000	71,244	(381,112)	5,896
	STRAIGHT	Diesel	EV	32	4,400,000	171,440	(2,906,785)	7,149
	STRAIGHT	Diesel	CNG	32	1,600,000	1,758,781	(3,068,706)	1,088
	SUV	Gasoline	HEV	811	2,027,500	71,244	4,180,999	13,768
	SUV	Gasoline	EV	811	7,907,250	4,628,880	4,661,696	24,952
	SUV	Gasoline	E85	811	-	194,874	(3,274,729)	14,473
	SUV	Gasoline	LPG	811	6,082,500	61,584	(3,410,799)	5,851
	SUV	Gasoline	PHEV	811	9,630,625	4,700,124	(5,582,238)	17,900
	SUV	Gasoline	CNG	811	12,671,875	1,758,781	(11,193,569)	5,994
	SUV	Gasoline	B20	811	7,096,250	179,016	(13,532,672)	12,134
	SWEEPER	Diesel	B20	7	-	200,937	622,996	1,883
	SWEEPER	Diesel	CNG	7	656,250	1,951,456	(1,872,317)	577
	VAN	Gasoline	EV	101	4,418,750	565,752	6,058,132	19,073
	VAN	Gasoline	LPG	101	1,010,000	61,584	1,336,139	4,554
	VAN	Gasoline	CNG	101	2,020,000	1,758,781	(686,447)	4,666
	VAN	Gasoline	B20	101	631,250	179,016	(1,880,161)	9,444
	VAN	Gasoline	E85	101	-	194,874	(2,576,312)	11,265

City of St. Augustine

St. Augustine is a coastal city located in St. Johns County, 40 miles south of Downtown Jacksonville. It has a total land area of approximately 9.52 square miles with a population of 14,300. Renowned as a prominent tourist destination and experiencing a continual rise in population, St. Augustine presents compelling opportunities to develop and enhance sustainable transportation solutions.

Fleet Description

The City of St. Augustine submitted data for 225 assets representing 19 distinct use cases. Police SUVs (58 vehicles), light-duty trucks (40 vehicles), and medium-duty trucks (30 vehicles) make up the majority fleet share. All fleet vehicles currently operate on either gasoline or diesel.

Recommendations

Converting the Police SUV fleet to HEV, and the medium-duty delivery step van fleet to diesel HEV are the most cost-effective alternative fuel conversion scenarios. As both scenarios involve conversion to hybrid-electric vehicles rather than EVs, the infrastructure cost remains relatively low, allowing for a combined \$2.3M net benefit and 5,143 mtCO_2e reduction in GHG emissions. Converting f the Police SUV fleet to EV, PHEV, or LPG also offer substantial net benefits and GHG reductions, however, high upfront costs for vehicles and infrastructure may present barriers to strategy implementation.

Additional opportunities for significant net benefit include utilizing B20 fuel in the heavy-duty dump truck fleet and the heavy-duty street sweeper fleet and converting the utility cargo van fleet to EV.

Table 16: City of St. Augustine Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	5	-	179,016	(88,722)	49
	BUCKET	Diesel	LNG	5	312,500	339,129	(729,369)	4
	BUCKET	Diesel	EV	5	1,250,000	17,144	(1,675,144)	228
	BUCKET	Diesel	CNG	5	375,000	1,758,781	(2,216,213)	15
	CAR	Gasoline	HEV	11	27,500	71,244	9,544	84
	CAR	Gasoline	EV	11	132,000	51,432	(15,097)	152
	CAR	Gasoline	LPG	11	82,500	61,584	(61,079)	33
	CAR	Gasoline	PHEV	11	96,250	122,676	(99,683)	87
	CAR	Gasoline	E85	11	-	194,874	(141,575)	82
	DUMP	Diesel	B20	12	-	200,937	198,979	797
	DUMP	Diesel	LNG	12	750,000	376,281	(1,429,214)	62
	DUMP	Diesel	CNG	12	900,000	1,951,456	(2,822,653)	244
	DUMP	Diesel	EV	12	3,000,000	840,505	(3,444,261)	3,521
	FIRE	Diesel	B20	5	-	200,937	95,000	530
	FIRE	Diesel	LNG	5	312,500	376,281	(913,940)	41
	FIRE	Diesel	CNG	5	375,000	1,951,456	(2,313,321)	162
	FREIGHT	Diesel	B20	7	-	200,937	141,938	650
	FREIGHT	Diesel	Diesel HEV	7	131,250	89,055	(90,887)	1,033
	FREIGHT	Diesel	LNG	7	262,500	376,281	(543,597)	323
	FREIGHT	Diesel	CNG	7	350,000	1,951,456	(1,923,458)	463
	FREIGHT	Diesel	EV	7	3,062,500	840,505	(3,579,949)	2,551
	LDTRUCK	Gasoline	LPG	40	325,000	61,584	(93,826)	463
	LDTRUCK	Gasoline	EV	40	1,230,000	222,872	(139,260)	1,973
	LDTRUCK	Gasoline	E85	40	-	194,874	(372,739)	1,144
	LDTRUCK	Gasoline	B20	40	350,000	179,016	(844,797)	959
	LDTRUCK	Gasoline	CNG	40	575,000	1,758,781	(1,981,958)	474

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	MDTRUCK	Gasoline	LPG	30	300,000	61,584	42,000	669
	MDTRUCK	Gasoline	EV	30	1,912,500	171,440	(315,182)	2,801
	MDTRUCK	Gasoline	E85	30	-	194,874	(483,805)	1,654
	MDTRUCK	Gasoline	B20	30	412,500	179,016	(962,840)	1,387
	MDTRUCK	Gasoline	CNG	30	300,000	1,758,781	(1,544,131)	685
	POLICECAR	Gasoline	HEV	4	10,000	71,244	164,289	299
	POLICECAR	Gasoline	LPG	4	30,000	61,584	39,950	118
	POLICECAR	Gasoline	EV	4	48,000	722,148	(166,498)	539
	POLICECAR	Gasoline	E85	4	-	194,874	(187,204)	292
	POLICECAR	Gasoline	B20	4	35,000	179,016	(506,921)	245
	POLICECAR	Gasoline	PHEV	4	35,000	793,392	(518,641)	378
	POLICECAR	Gasoline	CNG	4	35,000	1,758,781	(1,642,998)	121
	POLICESUV	Gasoline	HEV	58	145,000	71,244	2,356,775	4,187
	POLICESUV	Gasoline	EV	58	565,500	1,030,740	6,312,231	7,588
	POLICESUV	Gasoline	PHEV	58	688,750	1,101,984	1,777,975	5,522
	POLICESUV	Gasoline	LPG	58	435,000	61,584	484,689	1,779
	POLICESUV	Gasoline	E85	58	-	194,874	(1,081,928)	4,402
	POLICESUV	Gasoline	CNG	58	906,250	1,758,781	(1,421,712)	1,823
	POLICESUV	Gasoline	B20	58	507,500	179,016	(6,001,634)	3,690
	REFUSE	Diesel	B20	3	-	200,937	(34,253)	199
	REFUSE	Diesel	Diesel HEV	3	187,500	89,055	(49,066)	492
	REFUSE	Diesel	LNG	3	93,750	376,281	(457,419)	16
	REFUSE	Diesel	EV	3	750,000	840,505	(928,085)	857
	REFUSE	Diesel	CNG	3	131,250	1,951,456	(1,974,466)	61
	SHUTTLE	Gasoline	EV	2	67,500	17,144	143,889	260
	SHUTTLE	Gasoline	LPG	2	16,250	61,584	25,103	62
	SHUTTLE	Gasoline	B20	2	12,500	179,016	(147,800)	129
	SHUTTLE	Gasoline	E85	2	-	194,874	(157,083)	154
	SHUTTLE	Gasoline	CNG	2	25,000	1,758,781	(1,671,149)	64
	STEP	Diesel	Diesel HEV	2	37,500	71,244	17,108	956
	STEP	Diesel	EV	2	200,000	17,144	45,789	588
	STEP	Diesel	LPG	2	20,000	61,584	45,375	(33)
	STEP	Diesel	B20	2	-	179,016	(58,724)	126
	STEP	Diesel	LNG	2	75,000	339,129	(384,855)	10
	STEP	Diesel	CNG	2	100,000	1,758,781	(1,777,792)	39
	STRAIGHT	Diesel	B20	3	-	179,016	(35,611)	185
	STRAIGHT	Diesel	Diesel HEV	3	56,250	71,244	(83,817)	294
	STRAIGHT	Diesel	LNG	3	112,500	339,129	(390,456)	92
	STRAIGHT	Diesel	EV	3	1,312,500	17,144	(1,329,694)	725
	STRAIGHT	Diesel	CNG	3	150,000	1,758,781	(1,771,141)	132
	SUV	Gasoline	EV	10	97,500	51,432	133,491	308
	SUV	Gasoline	HEV	10	25,000	71,244	51,554	170
	SUV	Gasoline	LPG	10	75,000	61,584	(32,516)	72
	SUV	Gasoline	PHEV	10	118,750	122,676	(63,187)	221
	SUV	Gasoline	E85	10	-	194,874	(162,484)	178
	SUV	Gasoline	B20	10	87,500	179,016	(273,307)	150
	SUV	Gasoline	CNG	10	156,250	1,758,781	(1,804,751)	74
	SWEEP	Diesel	B20	3	-	200,937	203,066	807
	SWEEP	Diesel	CNG	3	281,250	1,951,456	(1,866,651)	247

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	VAN	Gasoline	EV	3	131,250	17,144	253,639	575
	VAN	Gasoline	LPG	3	30,000	61,584	50,107	137
	VAN	Gasoline	B20	3	18,750	179,016	(160,894)	285
	VAN	Gasoline	E85	3	-	194,874	(197,548)	340
	VAN	Gasoline	CNG	3	60,000	1,758,781	(1,656,426)	141

Fernandina Beach

Fernandina Beach is the county seat of Nassau County, the northernmost county on Florida's Atlantic Coast. Fernandina has a population of approximately 13,000 and covers 12 square miles.

Fleet Considerations

Fernandina Beach submitted data for 136 assets across 13 use cases included in this analysis. Light-duty SUVs (37 vehicles), light-duty passenger pick-up trucks (31 vehicles), and medium-duty pick-up trucks (28 vehicles) make up the majority fleet share. All fleet vehicles currently operate on either gasoline or diesel.

Recommendations

The analysis shows that seven (7) out of the 13 use cases would benefit from converting to either electric or hybrid electric vehicles. Even though the conversion of light-duty police SUVs to electric vehicles presents a high net benefit, the combination of high incremental costs associated with vehicle conversion and substantial infrastructure expenses categorize this scenario as a medium-feasibility option that warrants further in-depth analysis.

Utilizing B20 fuel in the dump truck fleet is the only alternative fuel strategy with a net benefit among the heavy-duty fleet vehicles. Additional cost-effective scenarios include converting the light commercial shuttle fleet to EV, the light-duty SUV fleet to HEV, and light commercial utility cargo van fleet to EV.

Table 17: Fernandina Beach Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	3	-	179,016	(96,342)	29
	BUCKET	Diesel	LNG	3	187,500	339,129	(544,775)	2
	BUCKET	Diesel	EV	3	750,000	17,144	(983,446)	138
	BUCKET	Diesel	CNG	3	225,000	1,758,781	(2,004,742)	9

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	CAR	Gasoline	EV	6	72,000	34,288	17,915	84
	CAR	Gasoline	HEV	6	15,000	71,244	5,206	46
	CAR	Gasoline	LPG	6	45,000	61,584	(28,925)	18
	CAR	Gasoline	PHEV	6	52,500	105,532	(60,607)	49
	CAR	Gasoline	E85	6	-	194,874	(133,418)	45
	DUMP	Diesel	B20	5	-	200,937	17,644	332
	DUMP	Diesel	LNG	5	312,500	376,281	(763,054)	26
	DUMP	Diesel	EV	5	1,250,000	840,505	(1,873,455)	1,485
	DUMP	Diesel	CNG	5	375,000	1,951,456	(2,262,506)	102
	LDTRUCK	Gasoline	LPG	31	251,875	61,584	(70,542)	358
	LDTRUCK	Gasoline	EV	31	953,250	171,440	(90,611)	1,550
	LDTRUCK	Gasoline	E85	31	-	194,874	(316,690)	887
	LDTRUCK	Gasoline	B20	31	271,250	179,016	(678,966)	743
	LDTRUCK	Gasoline	CNG	31	445,625	1,758,781	(1,915,713)	367
	MDTRUCK	Gasoline	LPG	28	280,000	61,584	39,844	624
	MDTRUCK	Gasoline	EV	28	1,785,000	154,296	(283,705)	2,652
	MDTRUCK	Gasoline	E85	28	-	194,874	(459,793)	1,544
	MDTRUCK	Gasoline	B20	28	385,000	179,016	(905,835)	1,294
	MDTRUCK	Gasoline	CNG	28	280,000	1,758,781	(1,553,691)	639
	POLICECAR	Gasoline	HEV	3	7,500	71,244	123,217	224
	POLICECAR	Gasoline	LPG	3	22,500	61,584	32,378	89
	POLICECAR	Gasoline	E85	3	-	194,874	(171,310)	219
	POLICECAR	Gasoline	EV	3	36,000	722,148	(287,599)	409
	POLICECAR	Gasoline	B20	3	26,250	179,016	(407,134)	184
	POLICECAR	Gasoline	PHEV	3	26,250	793,392	(569,517)	284
	POLICECAR	Gasoline	CNG	3	26,250	1,758,781	(1,654,132)	91
	POLICESUV	Gasoline	HEV	10	25,000	71,244	406,341	722
	POLICESUV	Gasoline	EV	10	97,500	756,436	568,554	1,326
	POLICESUV	Gasoline	LPG	10	75,000	61,584	91,562	307
	POLICESUV	Gasoline	PHEV	10	118,750	827,680	(272,175)	954
	POLICESUV	Gasoline	E85	10	-	194,874	(288,854)	759
	POLICESUV	Gasoline	B20	10	87,500	179,016	(1,123,955)	636
	POLICESUV	Gasoline	CNG	10	156,250	1,758,781	(1,641,705)	314
	SCHOOL	Diesel	LPG	2	20,000	61,584	171,845	(23)
	SCHOOL	Diesel	B20	2	-	179,016	(72,705)	90
	SCHOOL	Diesel	Diesel HEV	2	150,000	71,244	(177,866)	275
	SCHOOL	Diesel	EV	2	500,000	17,144	(189,663)	361
	SCHOOL	Diesel	LNG	2	50,000	339,129	(327,015)	7
	SCHOOL	Diesel	CNG	2	75,000	1,758,781	(1,731,607)	28
	SHUTTLE	Gasoline	EV	3	101,250	17,144	188,784	396
	SHUTTLE	Gasoline	LPG	3	24,375	61,584	32,824	93
	SHUTTLE	Gasoline	B20	3	18,750	179,016	(167,813)	193
	SHUTTLE	Gasoline	E85	3	-	194,874	(173,810)	230
	SHUTTLE	Gasoline	CNG	3	37,500	1,758,781	(1,662,956)	95
	STRAIGHT	Diesel	Diesel HEV	2	37,500	71,244	(55,878)	196
	STRAIGHT	Diesel	B20	2	-	179,016	(59,665)	123
	STRAIGHT	Diesel	LNG	2	75,000	339,129	(349,599)	61
	STRAIGHT	Diesel	EV	2	875,000	17,144	(868,430)	491

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	STRAIGHT	Diesel	CNG	2	100,000	1,758,781	(1,743,273)	88
	SUV	Gasoline	HEV	37	92,500	71,244	190,748	628
	SUV	Gasoline	EV	37	360,750	205,728	286,127	1,154
	SUV	Gasoline	LPG	37	277,500	61,584	(146,391)	267
	SUV	Gasoline	PHEV	37	439,375	276,972	(249,223)	823
	SUV	Gasoline	E85	37	-	194,874	(267,392)	660
	SUV	Gasoline	B20	37	323,750	179,016	(720,252)	554
	SUV	Gasoline	CNG	37	578,125	1,758,781	(2,121,228)	273
	SWEEPER	Diesel	B20	2	-	200,937	(78,354)	86
	SWEEPER	Diesel	CNG	2	187,500	1,951,456	(2,094,366)	26
	VAN	Gasoline	EV	4	175,000	17,144	320,152	777
	VAN	Gasoline	LPG	4	40,000	61,584	63,590	183
	VAN	Gasoline	B20	4	25,000	179,016	(178,601)	380
	VAN	Gasoline	E85	4	-	194,874	(222,188)	453
	VAN	Gasoline	CNG	4	80,000	1,758,781	(1,646,056)	187

Feeding Northeast Florida

Feeding Northeast Florida is a nonprofit food bank serving Baker, Bradford, Clay, Duval, Flagler, Nassau, Putnam, and St. Johns counties. Feeding Northeast Florida serves more than 85,000 people daily across a nearly 6,000 square mile service area.

Fleet Considerations

Feeding Northeast Florida was one of the smallest fleets analyzed and submitted data on 25 assets. The fleet includes seven different use cases, but diesel freight trucks represent the majority fleet share.

Recommendations

Due to the quantity and vehicle miles traveled, freight trucks present the greatest opportunity to reduce GHG emissions. Electric and diesel hybrids are both good alternatives for reducing GHG emissions; however, diesel hybrids are the most cost-effective strategy due to the lower investment compared to electric freight trucks. Utilizing B20 fuel in the freight truck fleet is also a cost-effective strategy, with relatively minimal upfront cost and a $1.4M net benefit.

Table 18: Feeding Northeast Florida Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	CAR	Gasoline	EV	3	36,000	17,144	80,202	92
	CAR	Gasoline	HEV	3	7,500	71,244	15,651	51
	CAR	Gasoline	LPG	3	22,500	61,584	(3,737)	20
	CAR	Gasoline	PHEV	3	26,250	88,388	(12,734)	60
	CAR	Gasoline	E85	3	-	194,874	(134,528)	50
	FREIGHT	Diesel	B20	11	-	200,937	1,433,208	3,959
	FREIGHT	Diesel	Diesel HEV	11	206,250	89,055	1,261,546	6,288
	FREIGHT	Diesel	EV	11	4,812,500	840,505	174,505	15,526
	FREIGHT	Diesel	CNG	11	550,000	1,951,456	(160,477)	2,818
	FREIGHT	Diesel	LNG	11	412,500	376,281	(292,646)	1,964
	LDTRUCK	Gasoline	EV	1	30,750	17,144	54,470	49
	LDTRUCK	Gasoline	LPG	1	8,125	61,584	7,084	12
	LDTRUCK	Gasoline	B20	1	8,750	179,016	(126,214)	24
	LDTRUCK	Gasoline	E85	1	-	194,874	(129,869)	29
	LDTRUCK	Gasoline	CNG	1	14,375	1,758,781	(1,694,883)	12
	MDTRUCK-D	Diesel	EV	3	150,000	17,144	235,145	274
	MDTRUCK-D	Diesel	LPG	3	(11,250)	61,584	158,761	(21)
	MDTRUCK-D	Diesel	B20	3	-	179,016	(76,787)	79
	MDTRUCK-D	Diesel	CNG	3	(11,250)	1,758,781	(1,523,075)	(18)
	STRAIGHT	Diesel	LPG	2	35,000	61,584	7,521	(25)
	STRAIGHT	Diesel	Diesel HEV	2	37,500	71,244	(23,820)	369
	STRAIGHT	Diesel	B20	2	-	179,016	(70,473)	96
	STRAIGHT	Diesel	EV	2	275,000	17,144	(121,312)	447
	STRAIGHT	Diesel	LNG	2	75,000	339,129	(365,484)	47
	STRAIGHT	Diesel	CNG	2	100,000	1,758,781	(1,773,860)	68
	SUV	Gasoline	EV	1	9,750	17,144	67,533	34
	SUV	Gasoline	HEV	1	2,500	71,244	5,897	19
	SUV	Gasoline	LPG	1	7,500	61,584	5,804	8
	SUV	Gasoline	PHEV	1	11,875	71,244	(163)	24
	SUV	Gasoline	B20	1	8,750	179,016	(125,005)	16
	SUV	Gasoline	E85	1	-	194,874	(127,883)	20
	SUV	Gasoline	CNG	1	15,625	1,758,781	(1,698,784)	8
	VAN	Gasoline	EV	4	175,000	17,144	313,611	755
	VAN	Gasoline	LPG	4	40,000	61,584	62,194	180
	VAN	Gasoline	B20	4	25,000	179,016	(177,966)	374
	VAN	Gasoline	E85	4	-	194,874	(220,766)	446
	VAN	Gasoline	CNG	4	80,000	1,758,781	(1,647,890)	185

Green Cove Springs

Green Cove Springs is a historic city located along the St. Johns River with a population of approximately 7,000 residents. Green Cove Springs, like many Florida communities, faces considerable threats related to sustainability and climate change. While the city's smaller size may distinguish it from larger urban areas, it shares common concerns like rising sea levels and severe weather.

Fleet Considerations

Green Cove Springs submitted data for 90 assets across 11 use cases included in this analysis. Light-duty passenger cars (22 vehicles), light-duty passenger trucks (22 vehicles), and light-duty SUVs (21 vehicles) make up the majority fleet share, approximately 67%. All fleet vehicles currently operate on either gasoline or diesel.

Recommendations

The analysis shows that two use cases could benefit from converting to either electric or hybrid electric vehicles. The most cost-effective strategy for Green Cove Springs to displace fuel is converting passenger cars to hybrid electric vehicles. Converting gasoline shuttles to electric shuttles would provide the greatest net benefit, but converting passenger cars to hybrid electric vehicles is nearly twice as cost-effective. This is primarily due to the lower investment required to convert to hybrid electric versus electric vehicles. Furthermore, converting the 22 passenger cars will result in greater reduced GHG emissions versus converting the one shuttle to electric.

Table 19: Green Cove Springs Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	8	-	179,016	(77,298)	78
	BUCKET	Diesel	LNG	8	500,000	339,129	(1,006,259)	6
	BUCKET	Diesel	CNG	8	600,000	1,758,781	(2,533,425)	24
	BUCKET	Diesel	EV	8	2,000,000	34,288	(2,729,867)	365
	CAR	Gasoline	HEV	22	55,000	71,244	8,645	146
	CAR	Gasoline	LPG	22	165,000	61,584	(136,536)	58
	CAR	Gasoline	EV	22	264,000	120,008	(147,092)	264
	CAR	Gasoline	E85	22	-	194,874	(154,714)	143
	CAR	Gasoline	PHEV	22	192,500	191,252	(231,194)	151
	DUMP	Diesel	B20	4	-	200,937	(101,905)	26
	DUMP	Diesel	LNG	4	250,000	376,281	(655,850)	2
	DUMP	Diesel	EV	4	1,000,000	840,505	(2,165,765)	113
	DUMP	Diesel	CNG	4	300,000	1,951,456	(2,291,587)	8
	FIRE	Diesel	B20	1	-	200,937	(93,552)	47
	FIRE	Diesel	LNG	1	62,500	376,281	(393,906)	4
	FIRE	Diesel	CNG	1	75,000	1,951,456	(1,963,735)	14
	LDTRUCK	Gasoline	LPG	22	178,750	61,584	(150,681)	59
	LDTRUCK	Gasoline	E85	22	-	194,874	(155,307)	145
	LDTRUCK	Gasoline	B20	22	192,500	179,016	(359,995)	122
	LDTRUCK	Gasoline	EV	22	676,500	120,008	(604,216)	251
	LDTRUCK	Gasoline	CNG	22	316,250	1,758,781	(1,985,373)	60
	LDTRUCK-D	Diesel	LPG	3	(1,875)	61,584	24,876	(2)
	LDTRUCK-D	Diesel	EV	3	123,750	17,144	(46,413)	24
	LDTRUCK-D	Diesel	B20	3	-	179,016	(105,085)	7
	LDTRUCK-D	Diesel	CNG	3	16,875	1,758,781	(1,691,070)	(2)
	REFUSE	Diesel	B20	4	-	200,937	(8,377)	265

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	REFUSE	Diesel	Diesel HEV	4	250,000	89,055	(65,421)	655
	REFUSE	Diesel	LNG	4	125,000	376,281	(514,149)	21
	REFUSE	Diesel	EV	4	1,000,000	840,505	(986,963)	1,142
	REFUSE	Diesel	CNG	4	175,000	1,951,456	(2,011,822)	81
	SHUTTLE	Gasoline	EV	1	33,750	17,144	36,283	29
	SHUTTLE	Gasoline	LPG	1	8,125	61,584	4,673	7
	SHUTTLE	Gasoline	B20	1	6,250	179,016	(117,478)	15
	SHUTTLE	Gasoline	E85	1	-	194,874	(127,413)	17
	SHUTTLE	Gasoline	CNG	1	12,500	1,758,781	(1,696,044)	7
	STRAIGHT	Diesel	LPG	3	52,500	61,584	(23,154)	(21)
	STRAIGHT	Diesel	Diesel HEV	3	56,250	71,244	(72,672)	315
	STRAIGHT	Diesel	B20	3	-	179,016	(75,895)	82
	STRAIGHT	Diesel	EV	3	412,500	17,144	(339,273)	382
	STRAIGHT	Diesel	LNG	3	112,500	339,129	(417,694)	41
	STRAIGHT	Diesel	CNG	3	150,000	1,758,781	(1,849,843)	58
	SUV	Gasoline	HEV	21	52,500	71,244	(16,966)	85
	SUV	Gasoline	LPG	21	157,500	61,584	(139,902)	36
	SUV	Gasoline	E85	21	-	194,874	(143,105)	89
	SUV	Gasoline	EV	21	204,750	120,008	(158,732)	154
	SUV	Gasoline	PHEV	21	249,375	191,252	(324,909)	109
	SUV	Gasoline	B20	21	183,750	179,016	(340,570)	75
	SUV	Gasoline	CNG	21	328,125	1,758,781	(2,013,834)	37
	SWEEPER	Diesel	B20	1	-	200,937	(6,899)	269
	SWEEPER	Diesel	CNG	1	93,750	1,951,456	(1,863,818)	82

JEA

JEA is the largest community-owned electric utility provider in Florida serving more than one million North Florida residents with electric, water, sewer and reclaimed water services. JEA's service area includes the City of Jacksonville, as well as parts of Nassau and St. Johns counties.

Fleet Considerations

JEA is the second largest fleet included in this study and submitted data for 1,644 assets. A total of 745 assets representing 10 use cases were included in the analysis. More than half of JEA's assets were not included in the analysis because they were either off-road vehicles or already using an alternative fuel. A total of 382 of JEA's cars, trucks, and vans are currently using either electric or E85 fuels and were not included in this analysis. The JEA fleet also includes 517 generators and off-road assets, which were not included in this analysis, but present additional opportunities for fuel displacement.

Recommendations

Several cost-effective scenarios to displace gasoline and diesel usage are within the JEA fleet due to the large fleet size and expansive service area. The four most cost-effective scenarios involve converting bucket, medium duty, straight, and dump trucks from diesel to B20. If all four use cases were converted to biodiesel there is a potential cumulative net benefit of $7.5M and reduction of 20,229 mt CO_2e.

Converting to biodiesel is cost effective because it does not require the purchase of new vehicles or any modifications to the existing vehicles, and the fuel is less expensive per gallon than diesel. Additionally, each use case analyzed included the cost to install and operate a private biodiesel fueling station, but this cost would only be incurred once making biodiesel even more cost-effective as more vehicles use biodiesel.

Table 20: Jacksonville Electrical Authority Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	185	-	179,016	3,080,145	8,168
	BUCKET	Diesel	LNG	185	11,562,500	339,129	(17,643,587)	637
	BUCKET	Diesel	CNG	185	13,875,000	1,758,781	(18,337,152)	2,502
	BUCKET	Diesel	EV	185	46,250,000	1,045,784	(50,949,524)	38,189
	CAR	Gasoline	EV	1	12,000	17,144	62,801	31
	CAR	Gasoline	HEV	1	2,500	71,244	5,217	17
	CAR	Gasoline	LPG	1	7,500	61,584	5,194	7
	CAR	Gasoline	PHEV	1	8,750	71,244	1,470	20
	CAR	Gasoline	E85	1	-	194,874	(127,263)	17
	DUMP	Diesel	B20	28	-	200,937	613,449	1,858
	DUMP	Diesel	LNG	28	1,750,000	376,281	(2,951,862)	145
	DUMP	Diesel	CNG	28	2,100,000	1,951,456	(4,103,003)	569
	DUMP	Diesel	EV	28	7,000,000	840,505	(7,034,742)	8,215
	FREIGHT	Diesel	B20	27	-	200,937	867,138	2,508
	FREIGHT	Diesel	Diesel HEV	27	506,250	89,055	(350,565)	3,985
	FREIGHT	Diesel	LNG	27	1,012,500	376,281	(1,276,087)	1,244
	FREIGHT	Diesel	CNG	27	1,350,000	1,951,456	(2,097,908)	1,785
	FREIGHT	Diesel	EV	27	11,812,500	840,505	(11,661,376)	9,838
	LDTRUCK	Gasoline	LPG	112	910,000	61,584	(280,102)	1,295
	LDTRUCK	Gasoline	EV	112	3,444,000	634,328	(528,454)	5,523
	LDTRUCK	Gasoline	E85	112	-	194,874	(821,136)	3,204
	LDTRUCK	Gasoline	B20	112	980,000	179,016	(2,171,442)	2,686
	LDTRUCK	Gasoline	CNG	112	1,610,000	1,758,781	(2,511,916)	1,327
	MDTRUCK	Gasoline	EV	22	1,402,500	120,008	473,402	3,093
	MDTRUCK	Gasoline	LPG	22	220,000	61,584	164,512	738
	MDTRUCK	Gasoline	E85	22	-	194,874	(521,316)	1,827
	MDTRUCK	Gasoline	B20	22	302,500	179,016	(888,071)	1,531
	MDTRUCK	Gasoline	CNG	22	220,000	1,758,781	(1,410,052)	756
	MDTRUCK-D	Diesel	B20	218	-	179,016	2,143,801	5,728
	MDTRUCK-D	Diesel	EV	218	10,900,000	1,234,368	11,992,806	19,938
	MDTRUCK-D	Diesel	LPG	218	(817,500)	61,584	10,844,344	(1,490)
	MDTRUCK-D	Diesel	CNG	218	(817,500)	1,758,781	10,263,368	(1,325)
	SHUTTLE	Gasoline	EV	2	67,500	17,144	256,460	441
	SHUTTLE	Gasoline	LPG	2	16,250	61,584	47,916	105
	SHUTTLE	Gasoline	B20	2	12,500	179,016	(166,302)	218
	SHUTTLE	Gasoline	E85	2	-	194,874	(180,318)	260
	SHUTTLE	Gasoline	CNG	2	25,000	1,758,781	(1,641,172)	108

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	STRAIGHT	Diesel	B20	83	-	179,016	1,440,135	3,966
	STRAIGHT	Diesel	LPG	83	1,452,500	61,584	(79,124)	(1,031)
	STRAIGHT	Diesel	Diesel HEV	83	1,556,250	71,244	(988,509)	15,293
	STRAIGHT	Diesel	LNG	83	3,112,500	339,129	(4,318,224)	1,967
	STRAIGHT	Diesel	CNG	83	4,150,000	1,758,781	(5,269,943)	2,823
	STRAIGHT	Diesel	EV	83	11,412,500	462,888	(7,671,234)	18,543
	SUV	Gasoline	HEV	29	72,500	71,244	171,010	539
	SUV	Gasoline	EV	29	282,750	154,296	306,495	977
	SUV	Gasoline	LPG	29	217,500	61,584	(102,176)	229
	SUV	Gasoline	PHEV	29	344,375	225,540	(159,029)	702
	SUV	Gasoline	E85	29	-	194,874	(246,975)	567
	SUV	Gasoline	B20	29	253,750	179,016	(607,542)	475
	SUV	Gasoline	CNG	29	453,125	1,758,781	(2,013,693)	235
	VAN	Gasoline	EV	29	1,268,750	154,296	1,845,823	5,557
	VAN	Gasoline	LPG	29	290,000	61,584	400,650	1,327
	VAN	Gasoline	B20	29	181,250	179,016	(621,283)	2,751
	VAN	Gasoline	E85	29	-	194,874	(838,172)	3,282
	VAN	Gasoline	CNG	29	580,000	1,758,781	(1,386,797)	1,359
	VAN - D	Diesel	EV	9	337,500	51,432	915,730	1,221
	VAN - D	Diesel	B20	9	-	179,016	30,164	351
	VAN - D	Diesel	LPG	9	33,750	61,584	428,303	(91)
	VAN - D	Diesel	CNG	9	123,750	1,758,781	(1,296,902)	(81)

Jacksonville Transportation Authority (JTA)

The Jacksonville Transportation Authority (JTA) is a public transit agency serving Duval County and the surrounding areas. JTA plays a crucial role in providing transportation services for residents and visitors, offering bus services, paratransit services, and operating the Jacksonville Skyway, an automated people mover system.

Fleet Considerations

JTA submitted data for 414 assets, and the analysis incorporated data from 412 assets, representing three use cases. JTA's fleet includes 263 transit buses, which is the largest use case within the fleet. JTA currently utilizes a variety of fuels, and its transit bus fleet includes 127 diesel, 127 CNG, seven diesel hybrid, and two electric buses. JTA and the North Florida TPO have invested millions into converting JTA's transit buses to CNG, and public and private CNG fueling stations at their fleet service center.

Recommendations

As transit buses are the largest use case in JTA's fleet, their on-going conversion to clean fuels will have a significant impact on petroleum fuel displacement. As shown in *Table 21*, the analysis indicates that converting transit buses to biodiesel is the most cost-effective strategy for reducing GHG emissions. In addition to biodiesel, continuing to convert transit buses to CNG would also result in diesel displacement, reduced emissions, and a positive net benefit. Considering the significant investment in CNG, it is likely

JTA will continue converting buses to CNG and shift more rapidly to electric buses as they become more cost-effective and widely available.

Switching JTA's freight trucks, which are heavy duty tow trucks, to biodiesel is another cost-effective opportunity to displace fuel and reduce GHG emissions within the JTA fleet. Biodiesel is cost-effective because it can be used immediately in diesel engines without any modifications. Furthermore, JTA could experience greater benefit by switching freight trucks and its existing diesel transit buses to biodiesel.

There is also an opportunity to convert JTA paratransit shuttles from gasoline to electric or LPG, although these alternatives are less cost-effective. Transitioning the shuttles to electric would provide the greatest benefit, however, it would cost more than four times as much as LPG. The primary reasons LPG is a more cost-effective strategy is because the existing shuttles can be converted to LPG for a relatively low cost, while converting to electric would require the purchase of new vehicles as well as charging infrastructure installation.

Table 21: Jacksonville Transportation Authority Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	FREIGHT	Diesel	B20	22	-	200,937	903,051	2,601
	FREIGHT	Diesel	Diesel HEV	22	412,500	89,055	(19,514)	4,131
	FREIGHT	Diesel	CNG	22	1,100,000	963,375	(725,514)	1,851
	FREIGHT	Diesel	LNG	22	825,000	376,281	(1,017,647)	1,290
	FREIGHT	Diesel	EV	22	9,625,000	840,505	(8,623,253)	10,199
	SHUTTLE	Gasoline	EV	127	4,286,250	720,048	5,898,146	17,876
	SHUTTLE	Gasoline	LPG	127	1,031,875	61,584	1,161,594	4,268
	SHUTTLE	Gasoline	CNG	127	1,587,500	770,700	566,268	4,373
	SHUTTLE	Gasoline	E85	127	-	194,874	(2,422,404)	10,558
	SHUTTLE	Gasoline	B20	127	793,750	179,016	(2,788,465)	8,852
	TRANSIT	Diesel	B20	127	-	179,016	8,723,097	22,627
	TRANSIT	Diesel	CNG	127	6,350,000	770,700	3,019,182	6,932
	TRANSIT	Diesel	LNG	127	4,762,500	339,129	(5,953,807)	1,764
	TRANSIT	Diesel	EV	127	63,500,000	720,048	(12,414,126)	66,659
	TRANSIT	Diesel	Diesel HEV	127	27,781,250	71,244	(35,542,966)	44,852

Nassau County

Nassau County is the northeastern most county in Florida with a population of approximately 98,000 and a land area of 726 square miles. The county's population has surged by more than 40,000 residents since the year 2000, driven by factors such as Nassau's proximity to downtown Jacksonville and tourism.

Fleet Considerations

Nassau County provided data on 554 assets and 300 assets across 13 use cases included in this analysis. The largest use case within the Nassau County fleet is light-duty trucks, followed by medium-duty trucks. Combined these two use cases account for 155 assets or 47% of the assets used in this analysis.

Recommendations

Switching to biodiesel accounts for two of the three most cost-effective scenarios for reducing GHG emissions within the Nassau County fleet. Biodiesel was identified as the most cost-effective alternative for heavy-duty vehicles, including fire trucks, bucket trucks, dump trucks, and street sweepers. A successful transition to biodiesel for these fleets would necessitate additional infrastructure investments. Should the county opt to extend this transition to other assets capable of operating on biodiesel, the cumulative net benefit may increase.

Converting ambulances to propane was also identified as a cost-effective alternative. Propane is a cost-effective strategy due to its low per gallon cost and minimal infrastructure investment. In addition to ambulances, utility cargo vans and medium-duty trucks that currently run on gasoline could also be converted to run on propane. The diesel medium-duty trucks would need to be replaced since they cannot be converted to propane. The cumulative net benefit may increase as propane is used for more use cases across the Nassau County fleet.

The analysis indicates that light-duty trucks, SUVs, utility cargo vans, shuttle vans, and passenger cars would benefit from converting to electric or hybrid electric vehicles. Converting light-duty trucks to electric presents a great opportunity to displace fuel and reduce operating costs; however, it would require significant investment. Electric trucks are also in high demand and could be difficult to source. Therefore, it recommended Nassau County consider also converting light-duty trucks to propane. As you can see in *Table 22*, converting light-duty trucks to propane produces a negative net benefit, but if propane was used for other use cases the net would likely increase.

Table 22: Nassau County Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	AMBULANCE	Gasoline	LPG	12	120,000	61,584	785,123	1,709
	AMBULANCE	Gasoline	CNG	12	240,000	1,758,781	(756,686)	1,751
	AMBULANCE	Gasoline	E85	12	-	194,874	(1,044,312)	4,229
	AMBULANCE	Gasoline	B20	12	165,000	179,016	(1,318,446)	3,545
	BUCKET	Diesel	B20	2	-	179,016	(73,308)	88
	BUCKET	Diesel	LNG	2	125,000	339,129	(455,730)	7
	BUCKET	Diesel	EV	2	500,000	17,144	(486,170)	417
	BUCKET	Diesel	CNG	2	150,000	1,758,781	(1,867,533)	27
	CAR	Gasoline	EV	5	60,000	17,144	57,672	98

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	CAR	Gasoline	HEV	5	12,500	71,244	11,459	54
	CAR	Gasoline	LPG	5	37,500	61,584	(19,277)	21
	CAR	Gasoline	PHEV	5	43,750	88,388	(29,423)	60
	CAR	Gasoline	E85	5	-	194,874	(135,063)	53
	DUMP	Diesel	B20	26	-	200,937	692,070	2,060
	DUMP	Diesel	LNG	26	1,625,000	376,281	(2,778,299)	161
	DUMP	Diesel	CNG	26	1,950,000	1,951,456	(3,791,000)	631
	DUMP	Diesel	EV	26	6,500,000	840,505	(5,866,244)	9,218
	FIRE	Diesel	B20	21	-	200,937	800,364	2,337
	FIRE	Diesel	LNG	21	1,312,500	376,281	(2,954,523)	182
	FIRE	Diesel	CNG	21	1,575,000	1,951,456	(3,735,296)	716
	LDTRUCK	Gasoline	EV	88	2,706,000	497,176	152,654	5,229
	LDTRUCK	Gasoline	LPG	88	715,000	61,584	(116,588)	1,209
	LDTRUCK	Gasoline	E85	88	-	194,874	(774,966)	2,992
	LDTRUCK	Gasoline	B20	88	770,000	179,016	(1,879,406)	2,508
	LDTRUCK	Gasoline	CNG	88	1,265,000	1,758,781	(2,201,988)	1,239
	MDTRUCK	Gasoline	LPG	54	540,000	61,584	67,871	1,204
	MDTRUCK	Gasoline	EV	54	3,442,500	308,592	(624,322)	5,114
	MDTRUCK	Gasoline	E85	54	-	194,874	(771,944)	2,978
	MDTRUCK	Gasoline	CNG	54	540,000	1,758,781	(1,429,406)	1,233
	MDTRUCK	Gasoline	B20	54	742,500	179,016	(1,646,894)	2,496
	MDTRUCK-D	Diesel	EV	13	650,000	68,576	377,120	877
	MDTRUCK-D	Diesel	LPG	13	(48,750)	61,584	491,286	(64)
	MDTRUCK-D	Diesel	B20	13	-	179,016	(10,690)	247
	MDTRUCK-D	Diesel	CNG	13	(48,750)	1,758,781	(1,157,782)	(57)
	SHUTTLE	Gasoline	EV	18	607,500	102,864	14,467	1,134
	SHUTTLE	Gasoline	LPG	18	146,250	61,584	(5,780)	267
	SHUTTLE	Gasoline	E85	18	-	194,874	(267,433)	661
	SHUTTLE	Gasoline	B20	18	112,500	179,016	(342,775)	554
	SHUTTLE	Gasoline	CNG	18	225,000	1,758,781	(1,742,975)	274
	STRAIGHT	Diesel	B20	9	-	179,016	108,367	554
	STRAIGHT	Diesel	LPG	9	157,500	61,584	59,428	(144)
	STRAIGHT	Diesel	Diesel HEV	9	168,750	71,244	(33,071)	2,135
	STRAIGHT	Diesel	EV	9	1,237,500	51,432	(508,215)	2,617
	STRAIGHT	Diesel	LNG	9	337,500	339,129	(700,234)	275
	STRAIGHT	Diesel	CNG	9	450,000	1,758,781	(2,010,143)	394
	SUV	Gasoline	HEV	48	120,000	71,244	339,287	1,014
	SUV	Gasoline	EV	48	468,000	274,304	598,290	1,863
	SUV	Gasoline	LPG	48	360,000	61,584	(148,059)	431
	SUV	Gasoline	PHEV	48	570,000	345,548	(205,369)	1,331
	SUV	Gasoline	E85	48	-	194,874	(355,683)	1,066
	SUV	Gasoline	B20	48	420,000	179,016	(986,541)	894
	SUV	Gasoline	CNG	48	750,000	1,758,781	(2,191,391)	441
	SWEEPER	Diesel	B20	1	-	200,937	(6,899)	269
	SWEEPER	Diesel	CNG	1	93,750	1,951,456	(1,863,818)	82
	VAN	Gasoline	EV	3	131,250	17,144	274,773	619
	VAN	Gasoline	LPG	3	30,000	61,584	54,617	146
	VAN	Gasoline	B20	3	18,750	179,016	(162,947)	302

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	VAN	Gasoline	E85	3	-	194,874	(202,141)	361
	VAN	Gasoline	CNG	3	60,000	1,758,781	(1,650,500)	149

NassauTRANSIT

NassauTRANSIT is a public transportation system operated by Nassau County Council on Aging. NassauTRANSIT provides essential mobility services for residents and visitors, offering fixed-route bus services, paratransit services for individuals with disabilities, and commuter express services. The system enhances connectivity within the county, offering affordable and accessible transportation options.

Fleet Considerations

NassauTRANSIT submitted data for a total of 15 assets, which was the smallest fleet included in the analysis. NassauTRANSIT's fleet includes seven shuttle vans, four light-duty SUVs, and four light-duty passenger pickup trucks.

Recommendations

The analysis shows that all three use cases would benefit from converting to EVs or HEVs. Converting shuttle vans to electric presented the greatest potential net benefit of $745,217 and the highest reduction of GHG emissions (1,565 mt CO_2e). While this was the most cost-effective opportunity for GHG reductions for shuttles, it would require significant investment in new vehicles and infrastructure. Converting the current shuttles to LPG is another option for reducing emissions and costs.

There were also multiple opportunities to reduce emissions with both SUVs and light-duty trucks. Converting SUV's to either EVs or HEVs would reduce emissions and result in a net benefit. HEVs are a more attractive opportunity due to the lower incremental vehicle cost versus EVs.

Converting light-duty trucks from gasoline to electric was shown to be the most cost-effective alternative for light-duty trucks. LPG was the second most cost-effective option for light-duty trucks but resulted in a slight negative net benefit due to the infrastructure costs. There is potential to reduce the overall LPG cost if NassauTRANSIT converts multiple vehicles or utilizes a public fueling station located in Nassau County.

Table 23: NassauTRANSIT Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	LDTRUCK	Gasoline	EV	4	123,000	17,144	55,337	200
	LDTRUCK	Gasoline	LPG	4	32,500	61,584	(689)	46
	LDTRUCK	Gasoline	E85	4	-	194,874	(148,541)	114
	LDTRUCK	Gasoline	B20	4	35,000	179,016	(181,475)	96
	LDTRUCK	Gasoline	CNG	4	57,500	1,758,781	(1,716,979)	47
	SHUTTLE	Gasoline	EV	7	236,250	34,288	351,218	924
	SHUTTLE	Gasoline	LPG	7	56,875	61,584	63,710	217
	SHUTTLE	Gasoline	E85	7	-	194,874	(240,717)	538
	SHUTTLE	Gasoline	B20	7	43,750	179,016	(247,869)	451
	SHUTTLE	Gasoline	CNG	7	87,500	1,758,781	(1,630,181)	223
	SUV	Gasoline	EV	4	39,000	17,144	99,571	125
	SUV	Gasoline	HEV	4	10,000	71,244	20,621	68
	SUV	Gasoline	LPG	4	30,000	61,584	(7,210)	29
	SUV	Gasoline	PHEV	4	47,500	88,388	(21,846)	89
	SUV	Gasoline	E85	4	-	194,874	(139,172)	71
	SUV	Gasoline	B20	4	35,000	179,016	(173,986)	60
	SUV	Gasoline	CNG	4	62,500	1,758,781	(1,734,422)	30

Neptune Beach

Neptune Beach, nestled along the Atlantic coast in Duval County, is a seaside community known for its pristine beaches and vibrant community. As part of the Jacksonville metropolitan area, Neptune Beach benefits from the economic and cultural dynamics of the larger region.

Fleet Considerations

Neptune Beach submitted data for 30 assets and all 30 assets representing eight use cases were included in the analysis. As seen in *Table 24*, the top three largest use cases making up approximately 83% of the entire fleet were light-duty trucks, medium-duty trucks and SUVs.

Recommendations

The analysis shows that multiple use cases would benefit from converting to electric. Converting SUVs to electric presents the greatest potential net benefit of $99,571, but HEVs were also a viable option to reduce costs and emissions.

Converting light-duty trucks to electric presents the greatest potential reduction in GHG emissions (690 mt CO_2e), however, electric trucks are currently difficult to acquire. LPG was identified as the most cost-effective option for displacing GHG emissions for medium-duty trucks, and if medium-duty trucks were converted to LPG it would also increase the conversion benefits for light-duty trucks by sharing the cost of infrastructure. Medium-duty trucks using diesel cannot be converted to LPG and electric was determined the most cost-effective alternative to reduce emissions.

Table 24: Neptune Beach Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	1	-	179,016	(103,962)	10
	BUCKET	Diesel	EV	1	250,000	17,144	(291,749)	46
	BUCKET	Diesel	LNG	1	62,500	339,129	(360,182)	1
	BUCKET	Diesel	CNG	1	75,000	1,758,781	(1,793,272)	3
	DUMP	Diesel	B20	1	-	200,937	(85,977)	66
	DUMP	Diesel	LNG	1	62,500	376,281	(382,392)	5
	DUMP	Diesel	EV	1	250,000	840,505	(975,851)	293
	DUMP	Diesel	CNG	1	75,000	1,951,456	(1,942,422)	20
	FREIGHT	Diesel	Diesel HEV	1	18,750	89,055	(47,546)	33
	FREIGHT	Diesel	B20	1	-	200,937	(103,831)	21
	FREIGHT	Diesel	LNG	1	37,500	376,281	(333,632)	10
	FREIGHT	Diesel	EV	1	437,500	840,505	(1,287,699)	81
	FREIGHT	Diesel	CNG	1	50,000	1,951,456	(1,915,370)	15
	LDTRUCK	Gasoline	EV	14	430,500	68,576	7,848	692
	LDTRUCK	Gasoline	LPG	14	113,750	61,584	(26,404)	162
	LDTRUCK	Gasoline	E85	14	-	194,874	(210,978)	401
	LDTRUCK	Gasoline	B20	14	122,500	179,016	(365,963)	336
	LDTRUCK	Gasoline	CNG	14	201,250	1,758,781	(1,790,379)	166
	MDTRUCK	Gasoline	EV	7	446,250	34,288	203,101	984
	MDTRUCK	Gasoline	LPG	7	70,000	61,584	58,931	235
	MDTRUCK	Gasoline	E85	7	-	194,874	(250,167)	581
	MDTRUCK	Gasoline	B20	7	96,250	179,016	(356,049)	487
	MDTRUCK	Gasoline	CNG	7	70,000	1,758,781	(1,599,246)	241
	MDTRUCK-D	Diesel	EV	1	50,000	17,144	124,547	100
	MDTRUCK-D	Diesel	LPG	1	(3,750)	61,584	63,411	(7)
	MDTRUCK-D	Diesel	B20	1	-	179,016	(96,528)	29
	MDTRUCK-D	Diesel	CNG	1	(3,750)	1,758,781	(1,628,212)	(7)
	SUV	Gasoline	EV	4	39,000	17,144	98,589	122
	SUV	Gasoline	HEV	4	10,000	71,244	20,269	67
	SUV	Gasoline	LPG	4	30,000	61,584	(7,382)	29
	SUV	Gasoline	PHEV	4	47,500	88,388	(22,328)	87
	SUV	Gasoline	E85	4	-	194,874	(138,997)	71
	SUV	Gasoline	B20	4	35,000	179,016	(173,663)	59
	SUV	Gasoline	CNG	4	62,500	1,758,781	(1,734,648)	29
	SWEEPER	Diesel	B20	1	-	200,937	(6,899)	269
	SWEEPER	Diesel	CNG	1	93,750	1,951,456	(1,863,818)	82

Orange Park

Orange Park is a suburban community located in the northeast corner of Clay County. It has a total land area of 3.6 square miles and a population of 9,089.

Fleet Considerations

Orange Park submitted fleet data for 25 gasoline light-duty trucks.

Recommendations

The fleet analysis did not identify any alternatives that would result in a net benefit. Among the alternatives considered, as seen in *Table 25*, converting the light-duty trucks to LPG would be the most cost-effective alternative but would result in a relatively small net loss. The city should investigate potential costs with a vendor to validate cost and benefit assumptions, since this analysis is close to the "break even" point. In addition, the project could improve by reducing the cost of infrastructure by using a public or existing LPG fueling station.

Converting the light-duty trucks to EVs was identified as the second most cost-effective alternative but would require three times the investment of LPG and the purchase of all new vehicles. If Orange Park did covert its fleet of light-duty trucks it would experience significantly better reductions in GHG emissions than LPG.

Table 25: Orange Park Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	LDTRUCK	Gasoline	LPG	25	203,125	61,584	(55,019)	289
	LDTRUCK	Gasoline	EV	25	768,750	137,152	(58,178)	1,233
	LDTRUCK	Gasoline	E85	25	-	194,874	(279,323)	715
	LDTRUCK	Gasoline	B20	25	218,750	179,016	(568,413)	600
	LDTRUCK	Gasoline	CNG	25	359,375	1,758,781	(1,871,550)	296

Ride Solution

Ride Solution is a non-profit agency that plays a pivotal role in providing public transportation not only within the city of Palatka but also in various communities across Putnam County. Anchored at the Palatka Union Depot, the system's central hub facilitates have access to Greyhound and Amtrak routes. Moreover, inter-county routes establish vital connections between Putnam County and JTA transit system, as well as the Gainesville Regional Transit System. Available services include regular bus services with routes spanning the Greater Palatka area, express bus services, paratransit services tailored for the disabled and elderly, vanpool services, and convenient park-n-ride parking facilities.

Fleet Considerations

Ride Solution submitted fleet data for a total of 21 vehicles, all included in the analysis. The fleet currently uses both gasoline and diesel. There are 15 gasoline shuttles and one diesel shuttle, and all transit buses use diesel.

Recommendations

The Ride Solution fleet has several options to reduce both costs and GHG emissions. Converting to EV was identified as the most cost-effective opportunity for all shuttles, including both gasoline and diesel. Converting these vehicles to EV models could result in substantial cost savings and reduced GHG emissions but would require the purchase of new vehicles and installing charging infrastructure.

If Ride Solution is not able to purchase new EV shuttles, there are opportunities to reduce emissions using existing vehicles. Converting the gasoline shuttles to LPG is a viable option and would result in a net benefit and reductions in GHG emissions. The diesel shuttles could start using biodiesel immediately.

Switching to biodiesel is the most cost-effective opportunity for transit buses because biodiesel is a drop-in fuel compatible with existing diesel vehicles. The only required investment would be dedicated biodiesel infrastructure, however, this cost could be reduced or avoided entirely if a public station is used, or the infrastructure cost is shared amongst municipalities.

Table 26: The Ride Solution Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	SHUTTLE	Gasoline	EV	15	506,250	85,720	639,900	1,921
	SHUTTLE	Gasoline	LPG	15	121,875	61,584	121,622	459
	SHUTTLE	Gasoline	E85	15	-	194,874	(370,601)	1,134
	SHUTTLE	Gasoline	B20	15	93,750	179,016	(404,849)	951
	SHUTTLE	Gasoline	CNG	15	187,500	1,758,781	(1,569,702)	470
	SHUTTLE-D	Diesel	EV	1	27,500	17,144	127,772	91
	SHUTTLE-D	Diesel	LPG	1	1,875	61,584	47,171	(7)
	SHUTTLE-D	Diesel	B20	1	-	179,016	(97,531)	26
	SHUTTLE-D	Diesel	CNG	1	6,250	1,758,781	(1,649,635)	(6)
	TRANSIT	Diesel	B20	5	-	179,016	182,290	743
	TRANSIT	Diesel	LNG	5	187,500	339,129	(494,167)	58
	TRANSIT	Diesel	EV	5	2,500,000	17,144	(859,286)	2,190
	TRANSIT	Diesel	Diesel HEV	5	1,093,750	71,244	(1,406,183)	1,473
	TRANSIT	Diesel	CNG	5	250,000	1,758,781	(1,618,087)	228

St. Augustine Beach

St. Augustine Beach is a coastal city in St. Johns County with a total land area of 2.12 square miles and a population of 6,176. St. Augustine Beach has a commitment to environmental conservation, with efforts to preserve its natural beauty and promote sustainable practices that align with the broader global goals of mitigating climate change impacts.

Fleet Considerations

St. Augustine Beach submitted data for 77 assets and a total of 64 vehicles were included in this analysis. As seen in *Table 27*, SUVs, light-duty trucks, and police SUVs represent the majority of the city's fleet vehicles (70%).

Recommendations

The analysis shows potential benefits by using several alternatives, including EVs, HEVs, LPG, and biodiesel. Converting light-duty police SUVs to EVs is the most cost-effective opportunity to reduce GHG emissions within the fleet. Converting police SUVs to EVs had a higher net benefit than HEVs but would require eight times the investment. The low costs associated with HEVs make it an attractive alternative for reducing GHG emissions.

The analysis showed that police cars and SUVs would also benefit from using LPG, however, the more practical options for LPG are medium-duty trucks and utility cargo vans. Vehicles can be converted to LPG, so this option would not require the purchase of new vehicles. There are also additional cost saving opportunities if multiple use cases are converted to LPG, resulting in an increased cumulative net benefit.

The only heavy-duty vehicle with a cost-effective option was to switch refuse trucks from diesel to biodiesel fuel. Biodiesel is cost-effective because it can be used immediately in existing diesel engines with no modifications. If St. Augustine Beach starts using biodiesel in refuse trucks, other diesel vehicles could also use the fuel resulting in greater GHG reductions.

Table 27: St. Augustine Beach Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	2	-	179,016	(100,152)	20
	BUCKET	Diesel	LNG	2	125,000	339,129	(452,479)	2
	BUCKET	Diesel	EV	2	500,000	17,144	(637,598)	91
	BUCKET	Diesel	CNG	2	150,000	1,758,781	(1,899,007)	6
	CAR	Gasoline	EV	2	24,000	17,144	47,753	28
	CAR	Gasoline	HEV	2	5,000	71,244	1,735	15
	CAR	Gasoline	LPG	2	15,000	61,584	(3,202)	6
	CAR	Gasoline	PHEV	2	17,500	71,244	(8,773)	16
	CAR	Gasoline	E85	2	-	194,874	(126,893)	15

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	DUMP	Diesel	B20	1	-	200,937	(85,977)	66
	DUMP	Diesel	LNG	1	62,500	376,281	(382,392)	5
	DUMP	Diesel	EV	1	250,000	840,505	(975,851)	293
	DUMP	Diesel	CNG	1	75,000	1,951,456	(1,942,422)	20
	LDTRUCK	Gasoline	EV	17	522,750	85,720	(9,220)	838
	LDTRUCK	Gasoline	LPG	17	138,125	61,584	(34,322)	197
	LDTRUCK	Gasoline	E85	17	-	194,874	(229,501)	486
	LDTRUCK	Gasoline	B20	17	148,750	179,016	(421,008)	408
	LDTRUCK	Gasoline	CNG	17	244,375	1,758,781	(1,812,666)	201
	MDTRUCK	Gasoline	EV	5	318,750	17,144	18,269	467
	MDTRUCK	Gasoline	LPG	5	50,000	61,584	15,050	111
	MDTRUCK	Gasoline	E85	5	-	194,874	(183,659)	276
	MDTRUCK	Gasoline	B20	5	68,750	179,016	(250,283)	231
	MDTRUCK	Gasoline	CNG	5	50,000	1,758,781	(1,663,636)	114
	POLICECAR	Gasoline	HEV	2	5,000	71,244	82,145	149
	POLICECAR	Gasoline	LPG	2	15,000	61,584	24,805	59
	POLICECAR	Gasoline	E85	2	-	194,874	(155,417)	146
	POLICECAR	Gasoline	B20	2	17,500	179,016	(307,347)	122
	POLICECAR	Gasoline	EV	2	24,000	722,148	(408,701)	270
	POLICECAR	Gasoline	PHEV	2	17,500	776,248	(603,250)	189
	POLICECAR	Gasoline	CNG	2	17,500	1,758,781	(1,665,267)	60
	POLICESUV	Gasoline	HEV	11	27,500	71,244	446,975	794
	POLICESUV	Gasoline	EV	11	107,250	756,436	693,929	1,439
	POLICESUV	Gasoline	LPG	11	82,500	61,584	99,752	337
	POLICESUV	Gasoline	PHEV	11	130,625	827,680	(223,749)	1,047
	POLICESUV	Gasoline	E85	11	-	194,874	(305,376)	835
	POLICESUV	Gasoline	B20	11	96,250	179,016	(1,225,573)	700
	POLICESUV	Gasoline	CNG	11	171,875	1,758,781	(1,637,122)	346
	REFUSE	Diesel	B20	6	-	200,937	43,392	398
	REFUSE	Diesel	Diesel HEV	6	375,000	89,055	(98,084)	983
	REFUSE	Diesel	LNG	6	187,500	376,281	(627,625)	31
	REFUSE	Diesel	EV	6	1,500,000	840,505	(1,104,576)	1,713
	REFUSE	Diesel	CNG	6	262,500	1,951,456	(2,086,524)	122
	SUV	Gasoline	EV	17	165,750	85,720	178,778	523
	SUV	Gasoline	HEV	17	42,500	71,244	87,641	289
	SUV	Gasoline	LPG	17	127,500	61,584	(62,039)	123
	SUV	Gasoline	PHEV	17	201,875	156,964	(105,704)	375
	SUV	Gasoline	E85	17	-	194,874	(189,683)	303
	SUV	Gasoline	B20	17	148,750	179,016	(389,182)	254
	SUV	Gasoline	CNG	17	265,625	1,758,781	(1,886,800)	126
	VAN	Gasoline	EV	1	43,750	17,144	120,613	192
	VAN	Gasoline	LPG	1	10,000	61,584	23,142	46
	VAN	Gasoline	B20	1	6,250	179,016	(125,479)	95
	VAN	Gasoline	E85	1	-	194,874	(148,269)	113
	VAN	Gasoline	CNG	1	20,000	1,758,781	(1,677,167)	47
	BUCKET	Diesel	B20	2	-	179,016	(100,152)	20

St. Johns County

Located just south of Duval County, St. Johns County is an integral part of the Jacksonville metropolitan area. Encompassing the municipalities of St. Augustine and St. Augustine Beach, the county has a total land area of 604 square miles with a population of 273,425. Predominantly characterized by residential developments, the county plays a significant role in the commuter landscape.

Fleet Considerations

St. Johns County submitted data for 953 assets and 680 assets were included in this analysis. St. Johns County's fleet included many off-road vehicles that were not included in the analysis. As seen in *Table 29*, light-duty pickup trucks, medium-duty pickup trucks, and SUVs represent nearly 75% of the total fleet included in this analysis.

Recommendations

The analysis indicates that four use cases could benefit from converting to either EV or HEV. Passenger cars and SUVs would most benefit from converting to HEVs, with EVs as the second most cost-effective opportunity. Converting to electric is the most cost-effective option for utility cargo vans, followed by LPG.

Biodiesel was identified as the most cost-effective opportunity to reduce GHG emissions for multiple heavy-duty use cases, including fire, freight, and straight trucks. Switching to biodiesel is cost-effective because it does not require any modifications to the existing vehicles and will result in GHG emissions reductions. The three refuse trucks operated by St. Johns County would also benefit from biodiesel, however, converting these vehicles to HEVs would result in the greatest benefit if replacement was an option.

St. Johns County fleet includes 378 light-duty and medium-duty trucks, and the analysis shows that converting these assets to LPG is the most cost-effective opportunity for reducing GHG emissions. St. Johns County currently operates its own CNG station and approximately 45% of light-duty and medium-duty trucks operate on CNG. Therefore, considering the county's investment in CNG, it is recommended St. Johns County continue converting its light-duty and medium-duty trucks to CNG.

Table 28: St. Johns County Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	BUCKET	Diesel	B20	1	-	179,016	(90,540)	44
	BUCKET	Diesel	EV	1	250,000	17,144	(216,035)	206
	BUCKET	Diesel	LNG	1	62,500	339,129	(361,808)	3
	BUCKET	Diesel	CNG	1	75,000	770,700	(789,454)	14
	CAR	Gasoline	HEV	26	65,000	71,244	135,644	444

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	CAR	Gasoline	EV	26	312,000	137,152	160,310	801
	CAR	Gasoline	PHEV	26	227,500	208,396	(98,929)	518
	CAR	Gasoline	LPG	26	195,000	61,584	(106,447)	175
	CAR	Gasoline	E85	26	-	194,874	(218,082)	434
	DUMP	Diesel	B20	5	-	200,937	17,641	332
	DUMP	Diesel	LNG	5	312,500	376,281	(763,054)	26
	DUMP	Diesel	CNG	5	375,000	963,375	(1,274,427)	102
	DUMP	Diesel	EV	5	1,250,000	840,505	(1,873,466)	1,467
	FIRE	Diesel	B20	31	-	200,937	1,170,796	3,287
	FIRE	Diesel	CNG	31	2,325,000	963,375	(3,670,019)	1,007
	FIRE	Diesel	LNG	31	1,937,500	376,281	(4,172,860)	256
	FREIGHT	Diesel	B20	31	-	200,937	1,012,178	2,880
	FREIGHT	Diesel	Diesel HEV	31	581,250	89,055	(402,500)	4,575
	FREIGHT	Diesel	CNG	31	1,550,000	963,375	(1,144,717)	2,050
	FREIGHT	Diesel	LNG	31	1,162,500	376,281	(1,422,585)	1,429
	FREIGHT	Diesel	EV	31	13,562,500	840,505	(13,277,661)	11,296
	LDTRUCK	Gasoline	LPG	122	991,250	61,584	(279,850)	1,460
	LDTRUCK	Gasoline	EV	122	3,751,500	685,760	(434,772)	6,227
	LDTRUCK	Gasoline	E85	122	-	194,874	(910,020)	3,612
	LDTRUCK	Gasoline	CNG	122	1,753,750	770,700	(1,563,111)	1,496
	LDTRUCK	Gasoline	B20	122	1,067,500	179,016	(2,394,381)	3,028
	MDTRUCK	Gasoline	LPG	83	830,000	61,584	99,133	1,850
	MDTRUCK	Gasoline	CNG	83	830,000	770,700	(302,699)	1,896
	MDTRUCK	Gasoline	EV	83	5,291,250	462,888	(986,437)	7,749
	MDTRUCK	Gasoline	E85	83	-	194,874	(1,120,113)	4,577
	MDTRUCK	Gasoline	B20	83	1,141,250	179,016	(2,473,460)	3,837
	REFUSE	Diesel	Diesel HEV	3	187,500	89,055	832,941	7,596
	REFUSE	Diesel	B20	3	-	200,937	278,053	999
	REFUSE	Diesel	EV	3	750,000	840,505	1,764,493	4,303
	REFUSE	Diesel	LNG	3	93,750	376,281	(716,717)	78
	REFUSE	Diesel	CNG	3	131,250	963,375	(841,674)	306
	SCHOOL	Diesel	LPG	1	10,000	61,584	107,877	(14)
	SCHOOL	Diesel	EV	1	250,000	17,144	(34,501)	211
	SCHOOL	Diesel	Diesel HEV	1	75,000	71,244	(86,971)	404
	SCHOOL	Diesel	B20	1	-	179,016	(87,017)	53
	SCHOOL	Diesel	LNG	1	25,000	339,129	(297,314)	4
	SCHOOL	Diesel	CNG	1	37,500	770,700	(717,188)	16
	STRAIGHT	Diesel	B20	32	-	179,016	489,011	1,529
	STRAIGHT	Diesel	LPG	32	560,000	61,584	(24,570)	(398)
	STRAIGHT	Diesel	Diesel HEV	32	600,000	71,244	(381,112)	5,896
	STRAIGHT	Diesel	LNG	32	1,200,000	339,129	(1,829,461)	759
	STRAIGHT	Diesel	CNG	32	1,600,000	770,700	(2,080,625)	1,088
	STRAIGHT	Diesel	EV	32	4,400,000	171,440	(2,906,785)	7,149
	SUV	Gasoline	HEV	126	315,000	71,244	649,576	2,139
	SUV	Gasoline	EV	126	1,228,500	720,048	783,546	3,877
	SUV	Gasoline	LPG	126	945,000	61,584	(521,755)	909
	SUV	Gasoline	E85	126	-	194,874	(613,197)	2,249
	SUV	Gasoline	PHEV	126	1,496,250	791,292	(868,165)	2,781

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	SUV	Gasoline	CNG	126	1,968,750	770,700	(2,176,349)	931
	SUV	Gasoline	B20	126	1,102,500	179,016	(2,193,515)	1,885
	VAN	Gasoline	EV	43	1,881,250	240,016	2,691,285	8,239
	VAN	Gasoline	LPG	43	430,000	61,584	589,404	1,967
	VAN	Gasoline	CNG	43	860,000	770,700	(253,531)	2,015
	VAN	Gasoline	B20	43	268,750	179,016	(869,185)	4,080
	VAN	Gasoline	E85	43	-	194,874	(1,183,124)	4,866

Sunshine Bus Company

The Sunshine Bus Company, operated through the Council on Aging, is a vital component of the St. Johns County public transportation network. Serving a diverse and growing population in St. Johns County, the Sunshine Bus Company facilitates connectivity between neighborhoods, business districts, and cultural attractions. Its two distinct modes, a fixed-route system with a set schedule operating within the St. Augustine Urbanized Area and a Demand Response door-to-door paratransit service, provide accessibility and convenience. Funded in part by the State of Florida Department of Elder Affairs, the Sunshine Bus Company plays a crucial role in addressing transportation needs, ensuring that a wide range of individuals, including those with disabilities and transportation disadvantages, can access public transportation services efficiently.

Fleet Considerations

The Sunshine Bus Company submitted data for a fleet of 47 gasoline shuttle vans.

Recommendations

The fleet analysis results indicate that transitioning from gasoline vans to EVs would yield the greatest net benefit, however, this option would require an estimated investment of $1.8 million. Another option that would also result in a net benefit is converting the shuttles to LPG. This option would not require the purchase of new vehicles and the infrastructure costs are more manageable compared to electric.

Table 29: Sunshine Bus Company Comprehensive Fleet Analysis

Priority	Use Case	Base Fuel	Alternative Fuel	Vehicle Count	Incremental Vehicle Cost ($)	Infrastructure Cost ($)	Net Benefit ($)	Reduced GHG (mt CO_2e)
	SHUTTLE	Gasoline	EV	47	1,586,250	257,160	1,924,126	6,114
	SHUTTLE	Gasoline	LPG	47	381,875	61,584	372,567	1,460
	SHUTTLE	Gasoline	E85	47	-	194,874	(909,787)	3,611
	SHUTTLE	Gasoline	B20	47	293,750	179,016	(1,048,420)	3,027
	SHUTTLE	Gasoline	CNG	47	587,500	1,758,781	(1,302,430)	1,495