

NORTH
FLORIDA
ALTERNATIVE
FUELS,
VEHICLES &
INFRASTRUCTURE
MASTER PLAN



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The North Florida Alternative Fuels, Vehicles and Infrastructure Master Plan team would like to thank the Stakeholder Working Groups for their on-going contribution to this plan.

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1. EXECUTIVE SUMMARY

The economic, social and environmental security of the North Florida region is strengthened by local actions to reduce petroleum dependence. Alternative fuels, alternative fuel vehicles (AFVs) and supporting infrastructure are a primary means of achieving this aim. At the same time, these alternatives can generate substantial benefits. Benefits include environmental stewardship, improved public health and enhanced economic competitiveness. This **North Florida Alternative Fuel, Vehicle and Infrastructure Master Plan** focuses on how the North Florida Transportation Planning Organization – via its North Florida Clean Fuels Coalition – can help secure these benefits for our region through education and strategic investment.

Clean fuels include biodiesel, electricity, ethanol, hydrogen, natural gas and propane. These fuels are used in a variety of vehicles. The fuels and vehicles have differing infrastructure requirements. Each combination has a distinct history and forecast of use. Each operates in different regulatory environments. Understanding how these characteristics and trends support the needs of North Florida’s commercial fleets and private motorists can help shape goals, strategies and projects to rapidly and cost-effectively increasing adoption of alternative fuels, vehicles and infrastructure in our region.

In the U.S. and in North Florida, vehicle fuel consumption has been dominated by gasoline and diesel fuel. However, unprecedented changes are occurring. Petroleum consumption is expected to decrease over the next several decades, while clean fuel use in high-efficiency vehicles will grow swiftly. **Section 3** of this Plan details these national trends and compares them to the situation in our region.

Alternative fuels, in contrast to petroleum fuels, are homegrown. Local prices tend to be equal to or less than gasoline or diesel. They are cleaner, reducing air pollution and greenhouse gas emissions. While many of these advantages are shared, alternative fuels differ in ways that help determine their best use in North Florida. **Section 4** contrasts the sources, prices, energy content and emissions of alternative fuels.

Vehicles that utilize clean fuels are diverse. **Section 5** reviews the fuel efficiency, range, cost and availability of AFVs. While broadly similar to conventional automobiles, AFVs can have reduced travel range and higher upfront costs. In the past, they have been in short supply. These features are changing as manufacturers respond to demand and incorporate new technologies. Still, differences in performance mean AFVs have distinctive roles to play in the region’s vehicle stock.

The infrastructure required to support alternative fuels and vehicles in North Florida is underdeveloped and new facilities are required. **Section 6** details infrastructure needs and their state of implementation in North Florida. The requirements, costs and permitting considerations vary widely among alternative fuels and vehicles and are critical components of investment decisions for fleet managers and car buyers alike.

Rules, programs and incentives exist at the federal, state and local level to help promote alternative fuels, vehicles and infrastructure. **Section 7** describes regulations at each level. A predictable and supportive environment for investment at the local level is essential. The North Florida Transportation Organization, through the North Florida Clean Fuel Coalition is playing a critical role in developing this support.



Current and announced projects in our region suggest that North Florida is poised to dramatically expand its use of alternative fuels, vehicles and infrastructure. **Section 8** summarizes these projects and forecasts their effect on petroleum use. Trends suggest that North Florida can meet and potentially exceed clean fuel goals set by the U.S. Department of Energy.

To achieve its goals, the North Florida Clean Fuels Coalition must strategically direct resources to overcome barriers to using petroleum-alternatives. **Section 9** establishes the Coalition's strategic priorities for each clean fuel.

These strategies will be the focus of projects. **Section 10** details the projects engaged to date. They are helping to establish the North Florida TPO and its North Florida Clean Fuels Coalition as the regional leadership organization for alternative fuels, vehicles and infrastructure.

With the help of community stakeholders, the North Florida Clean Fuels Coalition can implement this Alternative Fuels, Vehicles and Infrastructure Plan. The result will be a cleaner, healthier, more competitive region.

2. INTRODUCTION

2.1. PURPOSE

The economic, social and environmental security of the North Florida region is strengthened by supporting local actions to reduce petroleum dependence. Alternative fuels, alternative fuel vehicles (AFVs) and their supporting infrastructure are a primary means of achieving this aim. At the same time, these alternatives can generate substantial benefits for local fleet operators and motorists.

North Florida, like the nation as whole, fuels its vehicles primarily with gasoline and diesel. Today these fuels account for about 94 percent of total use in the United States. Both are finite resources, extracted from underground petroleum deposits first laid down millions of years ago.

While the United States consumed 21 percent of the world's petroleum in 2012 – more than any other country – domestic production amounted to 12 percent of the global total. New technologies have led to the first period of increasing domestic petroleum production in more than 40 years in our country. Nevertheless, oil imported from foreign nations remains indispensable for meeting demand.¹ While imports are expected to decline over the near term, current geological science indicates that the U.S. holds just 2 percent of global crude oil reserves.

It is clear that the world's current rate of consumption cannot be maintained in a conventional manner indefinitely.² As a result of tightening global supply and demand, petroleum values are increasingly volatile, with rising prices projected for the foreseeable future. At the same time, increasing concerns about the health and environmental effects of pollution stand in the way of extracting all the world's petroleum reserves.

This Plan focuses on how the North Florida Transportation Planning Organization via the North Florida Clean Fuels Coalition can reduce petroleum dependence. The main strategy to accomplish this is accelerating adopting alternative fuels, fuel-efficient AFVs and supportive infrastructure. This will be accomplished through education, coalition building, coordinated planning and strategic investment.

2.2. BENEFITS

It is reasonable to expect gasoline and diesel to supply a majority share of the region's transportation fuel consumption for the foreseeable future. However, increasing the rate at which alternative fuels replace conventional fuels in North Florida's vehicles can result in a host of benefits to the community, including the following:

- Reduced costs of fueling, operating and maintaining vehicles
- Improved operational performance (i.e. energy efficiency)
- Enhanced risk management (e.g. reduced price volatility and/or supply volatility)
- Reduced dependence on foreign suppliers
- Economic development (e.g. infrastructure investment, new markets, etc.)

¹ Energy Information Administration. (2013). *International Energy Statistics*. Retrieved January 2, 2014 from <http://www.eia.gov/countries/data.cfm>

² Ibid.



- Job creation
- Reduced nuisance (e.g. noise, odor, etc.)
- Improved public health (i.e. from improve air quality, reduced toxicity)
- Better regulatory compliance
- Reduced toxicity (e.g. as a result of fuel spills and other accidents)
- Reduction of local air pollution
- Decrease of greenhouse gas (GHG) emissions

The basis for these benefits will be explored in greater detail by discussing specific characteristics of alternative fuels, vehicles and infrastructure in **Sections 4, 5 and 6.**

2.3. STUDY AREA

This strategy applies specifically to North Florida. It is meant to align with the planning scope of the North Florida TPO, whose boundary includes Duval, Clay, Nassau and St. Johns Counties. It is also meant to parallel the scope of the North Florida Clean Fuels Coalition, which includes citizens, businesses, governments and non-profit agencies located in Baker, Clay, Duval, Nassau, Putnam and St. Johns Counties.

The region’s population is just under 1.5 million, with over 90 percent concentrated in Duval, St. Johns and Clay Counties (**Table 1**). The major urban center of the region is Jacksonville. Other incorporated urbanized areas include Maccleny in Baker County; Orange Park and Green Cove Springs in Clay County; the communities of Atlantic, Neptune and Jacksonville Beach in Duval County; Fernandina Beach in Nassau County; Palatka and Crescent City in Putnam County; and St. Augustine and St. Augustine Beach in St. Johns County. Clay, Duval and St. Johns County also include large areas of incorporated or non-incorporated suburban development. While all counties in the region include rural areas, these predominate in Baker, Nassau and Putnam Counties.

TABLE 1: POPULATION OF NORTH FLORIDA, 2012

County	Population	Percentage
Baker	27,086	2%
Clay	194,345	13%
Duval	879,602	61%
Nassau	74,629	5%
Putnam	73,263	5%
St. Johns	202,188	14%
Total	1,451,113	100%

2.4. CLEAN CITIES PROGRAM AND THE CLEAN FUELS COALITION

The Clean Cities program supports local actions to reduce petroleum use by 2.5 billion gallons per year by 2020. Organized by the U.S. Department of Energy (DOE), the program has fostered coalitions in nearly 100 communities across the United States. Through these partnerships the program promotes alternative fuels, fuel economy improvements and fuel-saving technologies. Clean Cities provides funding, informational resources, technical assistance and other tools to



support these strategies. In Northeast Florida, the Clean Cities program is hosted by the North Florida Transportation Planning Organization (TPO).

As a result of the Jacksonville Community Council 2007 Air Quality Advocacy Task Force recommendations, the TPO began holding stakeholder meetings in 2008 to explore interest in the use of alternative transportation fuels. Through continued outreach and education, the North Florida TPO built a core group of committed stakeholders. In 2010, the North Florida TPO established the North Florida Clean Cities Coalition as a non-profit organization to encourage petroleum reduction for business, government and non-profit agencies in Baker, Clay, Duval, Nassau, Putnam and St. Johns counties. The North Florida TPO provides Congestion Mitigation and Air Quality (CMAQ) funds to staff and support Coalition activities.

The organization was renamed the North Florida Clean Fuels Coalition in 2013 to better reflect its mission. The Coalition has diverse stakeholders including businesses; fleet managers; vehicle dealers; fuel providers; environmental advocates; federal, state and local government agencies; and private citizens. The Coalition advocates using alternative fuels, advanced vehicle technologies and infrastructure to reduce dependence on imported petroleum, develop regional economic opportunities and improve air quality.

The North Florida TPO and Clean Fuels Coalition focus on coordinated planning, education and strategic investment to achieve the U.S. DOE's goal of displacing local petroleum use by 17 percent annually. Through these activities the Coalition is seeking official designation by the DOE to obtain additional benefits, including training, technical assistance, networking and mentoring opportunities with other Coalitions and access to human and financial resources.

In addition to regular Coalition gatherings, the NFCFC holds several public educational events throughout the year, including an annual Alternative Fuel Vehicle Exposition. Information on the North Florida Clean Fuels Coalition's accomplishments and progress towards achieving DOE goals is included in **Section 8**. Strategies it is following and Projects it is spearheading to reduce petroleum-dependence are detailed in **Sections 9** and **10**, respectively.

As part of this planning process, the NFCFC has established Stakeholder Working Groups (SWGs) for each alternative fuel, including biofuels (biodiesel and ethanol), electricity, hydrogen, natural gas, and propane. Participants in these SWGs are detailed in the **Acknowledgements** section. These SWGs have helped inform each section of this Master Plan. In particular, the SWGs have been instrumental in establishing Strategies (**Section 9**) and Projects (**Section 10**) that will overcome barriers to widespread adoption of alternative fuels, vehicles and infrastructure and help make the region healthier, more competitive and environmentally sound



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3. CONTEXT

Alternative transportation fuels include electricity, ethanol, hydrogen, natural gas, biomass-based diesels and propane. These fuels are the focus of the U.S. Department of Energy's Clean Cities Program and the Energy Policy Act of 1992. Several other potential transportation fuel sources are under development (e.g. "renewable" or "drop-in" biofuels, biobutanol, methanol, ammonia, etc.); however, these emerging fuels are not addressed in this strategy. The six alternative fuels considered in this strategy may be used in a variety of light, medium and heavy-duty vehicles. Each fuel and application has differing infrastructure requirements. In this section, the six alternative fuels are briefly described. In addition, the historical patterns of alternative fuel use and vehicles adoption are reviewed. Forecasts of how these patterns may change in the future are also summarized.

3.1. DEFINITIONS

Alternative transportation fuels include biodiesel, electricity, ethanol, hydrogen, natural gas, and propane. These fuels and the vehicles that utilize them have the potential to meet a significant portion of the transportation needs in North Florida.

BIODIESEL

Biodiesel is a non-petroleum diesel fuel sourced from vegetable oils, waste restaurant grease and animal fats. It is non-toxic, bio-degradable and considered a renewable resource. The fuel is produced domestically via a process called transesterification, which catalyzes fats / oils and alcohol to produce biodiesel and by-products, including glycerol. While this is the most commercial pathway for producing the fuel, other feedstocks (e.g. algae) and production methods (e.g. colocation at petroleum refineries) are being developed.



Pure biodiesel (B100) is blended with petroleum diesel for use in diesel engines. A 20 percent blend (B20) is the most common alternative diesel fuel in the United States. While blends of any percentage are feasible, blends greater than 40 percent may require modification to standard diesel engines. Blends lower than 20 percent are typically not considered alternative fuel under various federal programs (e.g. the Energy Policy Act of 1992). The American Society for Testing and Materials (ASTM) standard for conventional diesel fuel allows biodiesel content of up to 5 percent without labeling the fuel as biodiesel.

ELECTRICITY

A familiar source of power in buildings, electricity may also be used to power all-electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs). Like a building, these vehicles draw electric power produced by electric utilities and supplied by their transmission and distribution network (i.e. "the grid"). Electric power can be produced from a variety of primary energy sources such as coal, natural gas, uranium (i.e. "nuclear power"), moving water (i.e. "hydroelectric power"), wind and sunlight (i.e. "solar power"). The specific mix of sources may vary significantly over time and location. Unlike most homes, electric vehicles store power on-board in rechargeable batteries. EVs utilize batteries to energize an electric motor. PHEVs pair battery storage with an

internal combustion engine (ICE) fueled by gasoline or diesel to enhance fuel efficiency. Standard gasoline / electric hybrid vehicles generate electricity from on-board generators and achieve fuel efficiency gains similar to (although lesser than) PHEVs.

ETHANOL

Ethanol is a renewable fuel derived from fermenting and distilling plant materials in a manner similar to producing alcohol. In the United States, the primary feedstock is corn. Sugar cane is a common feedstock in warmer climates. Non-food based feedstocks (i.e. “Cellulosic ethanol”) are being developed to improve ethanol’s energy balance. Energy balance compares the amount of energy required to produce a fuel to the energy contained in the fuel.

Most gasoline consumed in the United States includes up to 10 percent ethanol as an oxygenate. In the U.S., oxygenates are added to fuel to reduce air pollution. A blend of 85 percent ethanol to gasoline (E85) is considered an alternative fuel and can be used in flex fuel vehicles (FFVs). FFVs are vehicles capable of operating on gasoline and/or E85.

HYDROGEN

Like electricity, hydrogen is technically not a fuel. Instead, it is a way of “carrying” energy produced from other feedstocks. The most abundant element in the universe, hydrogen can be produced from a multitude of sources. However, the most common source is natural gas via a process called reforming. Using electric current to split water into hydrogen and water through a method called electrolysis is another, far less common method.

Hydrogen in a gaseous state may be combusted in an ICE or used in fuel cell vehicles (FCVs). Fuel cells generate electricity via an electrochemical process. The electricity is used to power the vehicle in a manner similar to EVs.

While hydrogen has potential as a highly efficient fuel with advantageous environmental characteristics, it is neither widely available nor economical today. In addition, hydrogen’s low density presents challenges for storing fuel on-board an automobile. These and other considerations limit the near-term potential of this alternative fuel.



NATURAL GAS

Natural gas is predominantly methane, with traces of other hydrocarbons. It is typically a non-renewable fossil fuel mined alongside oil from underground rock formations. It can be produced renewably from organic waste. Before use as a fuel, natural gas is refined to remove impurities. It is delivered via an extensive transmission and distribution network designed to meet demand for heating, cooking, industrial processes and electric power generation.

The majority of natural gas consumed in the U.S. is produced domestically. Until recently, increased consumption was forecast to result in greater dependence on foreign sources. However, recent technological advances including horizontal drilling and hydraulic fracturing

(i.e. “fracking”) have allowed previously inaccessible sources to be tapped. The result has been new domestic (and global) abundance.

Presently, less than 3 percent of U.S. natural gas consumption is devoted to transportation. It must be compressed (CNG) or liquefied (LNG) for use in vehicles. As CNG, natural gas is compressed to about 3,600 pounds per square inch (for comparison, a standard car tire is inflated to about 30 psi) and stored in reinforced containers. LNG is purified and cooled to -260⁰F and stored in insulated cylinders. LNG occupies about 1/600 the volume of CNG. As a result, more energy can be stored on-board LNG vehicles. Both CNG and LNG vehicles utilize specialized internal combustion engines.

PROPANE

Propane is familiar to many as Liquefied Petroleum Gas (LPG) – the fuel that fires barbeque grills. This fuel has diverse applications and has been used as a transportation fuel for decades. As “Autogas,” propane is the world’s third most common engine fuel behind gasoline and diesel (though this is not the case in the United States).

Propane is a non-renewable, petroleum-based fuel. It is produced in roughly equal proportions as a byproduct of domestic oil refining and natural processing. It is stored on-board a vehicle as a liquid at about 150 psi. When drawn from its storage tank, the fuel changes to a gas and is combusted in an ICE. Propane is used in vehicles with dedicated fuel systems. It may also be used in bi-fuel vehicles, with two separate fueling systems for Autogas and gasoline. Propane vehicles are available via conversions of gasoline vehicles. Increasingly, original equipment manufacturer (OEM) propane vehicles are available as well.



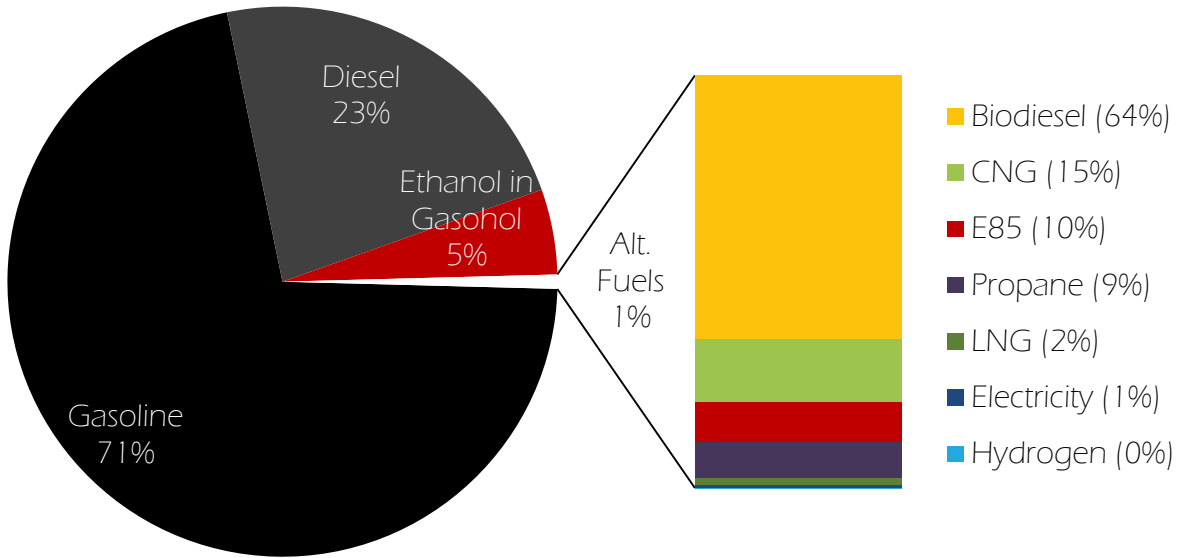
3.2. BASELINE

Vehicle fuel consumption in the U.S. is dominated by gasoline and diesel fuel. In 2011, the most recent year for which data is available, these fuels supplied about 71 percent and 23 percent, respectively, of demand. The alternative fuels defined in the previous section comprised the remainder (about 6 percent). Most gasoline sold in the U.S. contains up to 10 percent ethanol by volume. If ethanol in gasoline is not considered, alternative fuels made up just below 1 percent of the total. These quantities are reflected in **Figure 1**, below.³

Figure 1 also represents the relative share of transportation fuel consumption among the alternative fuels, with biodiesel meeting nearly as much consumption (64%) as all other alternative fuels combined. CNG (15%), E85 (10%) and propane (9%) made up significant proportions of total alternative fuel use, while LNG (2%) and electricity (1%) supplied very little. Hydrogen’s share was essentially zero (0.01%).

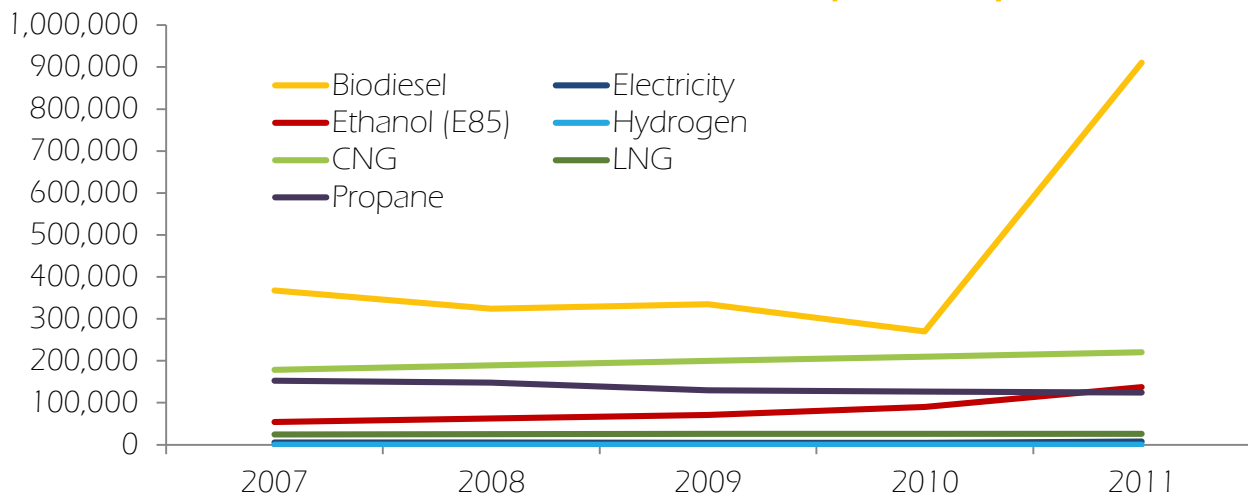
³ Energy Information Administration. (2012). Quantities are measured in gasoline gallons equivalent.

FIGURE 1: ESTIMATED CONSUMPTION OF VEHICLE FUELS (1000 GGES), 2011



The total consumption of alternative fuels excluding ethanol in gasohol has nearly doubled in recent years. Consumption has increased by double-digit rates for hydrogen, E85, biodiesel, electricity and CNG. LNG use increased more slowly. Consumption of propane declined slightly over the period. **Figure 2** charts changes in alternative fuel consumption over the period 2007 – 2011 in gaseous gallon equivalents (GGE).

FIGURE 2: ESTIMATED CONSUMPTION OF ALT. FUELS (1000 GGE), 2007 - 2011



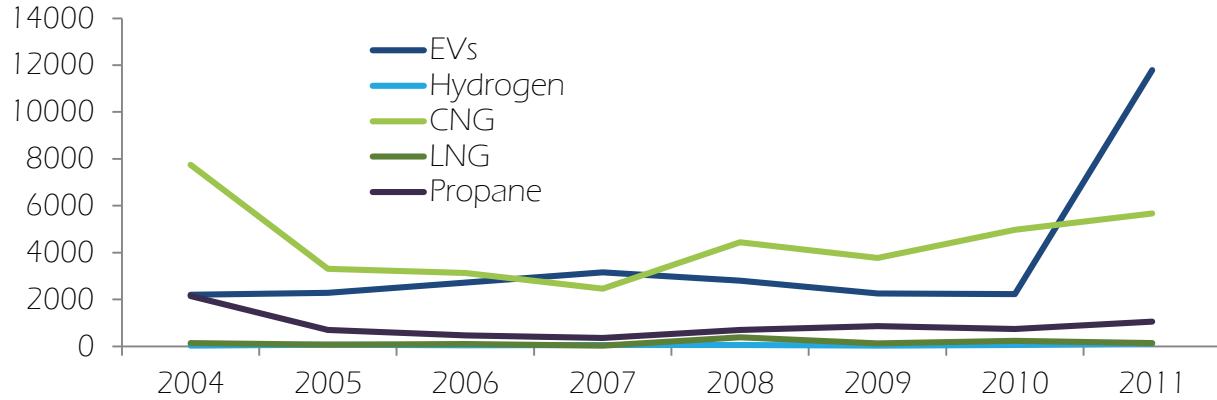
In 2011, over 250 million highway vehicles were registered in the United States. About 92 percent were classified light duty vehicles.⁴ Alternative fuel vehicles and hybrid-electric vehicles (“hybrids”) make less than 1 percent of the total, though it is important to recall that B20 may be utilized in conventional vehicles. The total of AFVs and hybrids is dominated by Flex Fuel Vehicles, which comprise 88 percent. Hybrids make up 11 percent of the total. While not

⁴ U.S. DOT Bureau of Transportation Statistics. (2013). *Number of U.S. Aircraft, Vehicles, Vessels and Other Conveyances*. Retrieved January 6, 2014 from http://www.rita.dot.gov/bts/sites/rita.dot.gov/bts/files/publications/national_transportation_statistics/html/table_01_11.html

considered AFVs, hybrids are nevertheless an important strategy for reducing petroleum dependence.

Figure 3 charts the change in AFVs and hybrids in service over the period 2004 – 2011. E85 and hybrid vehicles are excluded from the figure to illustrate the relative change among the remaining AFVs, which are far fewer in number. While not depicted in Figure 3, the totals of hybrid and E85 vehicles have grown steadily (66% and 30%, respectively) since 2004, with the exception of 2008 – 2009, a period which coincides with the global economic recession.

FIGURE 3: AFV AND HYBRID VEHICLE SUPPLY, 2004 - 2011



As Figure 3 indicates, electricity-powered vehicles have grown dramatically since 2010. CNG vehicles have also seen sustained growth after a recent decline. In fact, electric, CNG, LNG and propane vehicles have yet to exceed totals achieved approximately ten years ago.⁵

Conditions in the six-county North Florida region are similar to the national baseline. Considering available data, which is limited, consumption of alternative fuels is well below 1 percent, or about 1.2 million gallons per year in 2013. Based on available data, propane appears to make up about 64 percent of present alternative fuel consumption in North Florida, with biofuels supplying about 19 percent, electricity 9 percent and E85 8 percent. In the past, there has been little or no natural gas or hydrogen use. Historical time-series data is not available to characterize the rate of alternative fuel use or AFV adoption in North Florida. However, data available for EVs and PHEVs appears to mirror the rapid growth seen nationally.

Actual use of alternative fuels and vehicles is likely higher than these estimates, which rely on limited data. But the underlying message is the same: alternative fuels, vehicles and infrastructure are under-utilized in the region, given their substantial benefits. However, as discussed in the next section, the information that is available indicates that North Florida may be poised to experience unprecedented growth in alternative fuels, vehicles and infrastructure in the near future.

⁵ Energy Information Administration. (2013). Alternative Fuel Vehicle Data. Retrieved January 6, 2013 from <http://www.eia.gov/renewable/afv/index.cfm>

3.3. FORECAST⁶

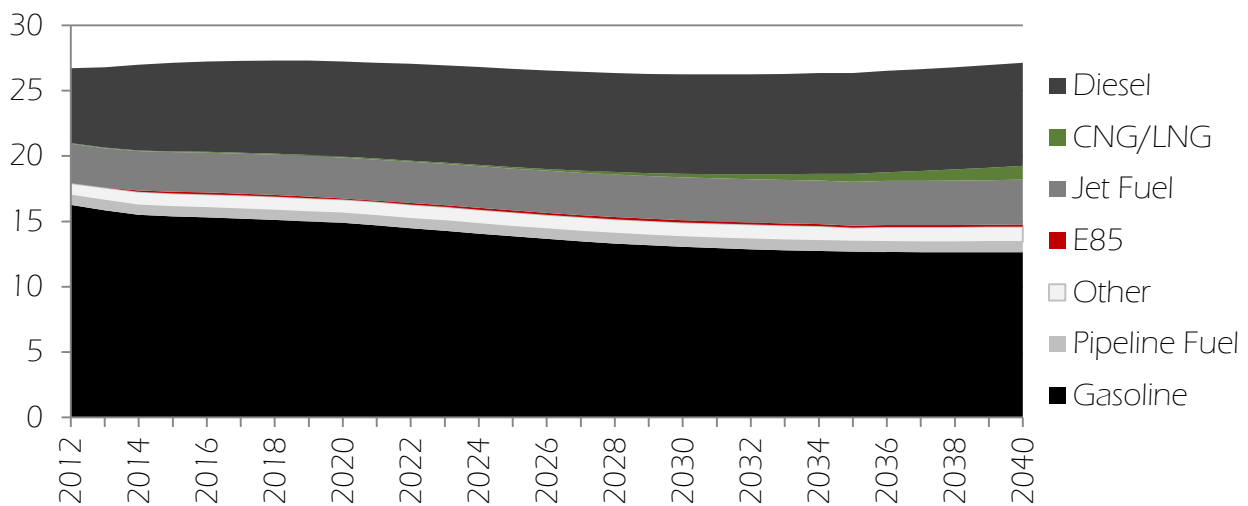
Through 2040, gasoline consumption in the U.S. is forecast to go down, while diesel consumption will go up. Due to the dominance of gasoline, however, petroleum use as a whole will decrease. Including all fuels, total energy consumption in the transportation sector will remain flat relative to 2011.

These forecasted transportation changes are unprecedented. They are attributed to moderating increases in vehicle miles travelled, increasing use of alternative fuels and increased fuel efficiency for light duty vehicles (LDVs).

Corporate average fuel economy (CAFE) standards, along with rising fuel prices⁷ and changing consumer preferences are causing increases in fuel efficiency. These factors are expected to raise average fuel economy of LDVs from 32.5 in 2012 to nearly 50 mpg in 2040.

While energy consumption is forecast to decrease for LDVs, it will increase for heavy-duty vehicles, which primarily rely on diesel. Increased use of biodiesel, other biofuels and natural gas may offset some diesel consumption. These trends are reflected in **Figure 4**, which charts expected changes in transportation energy from 2012 through 2040.

FIGURE 4: FORECASTED TRANSPORTATION ENERGY USE (QUADRILLION BTUS)

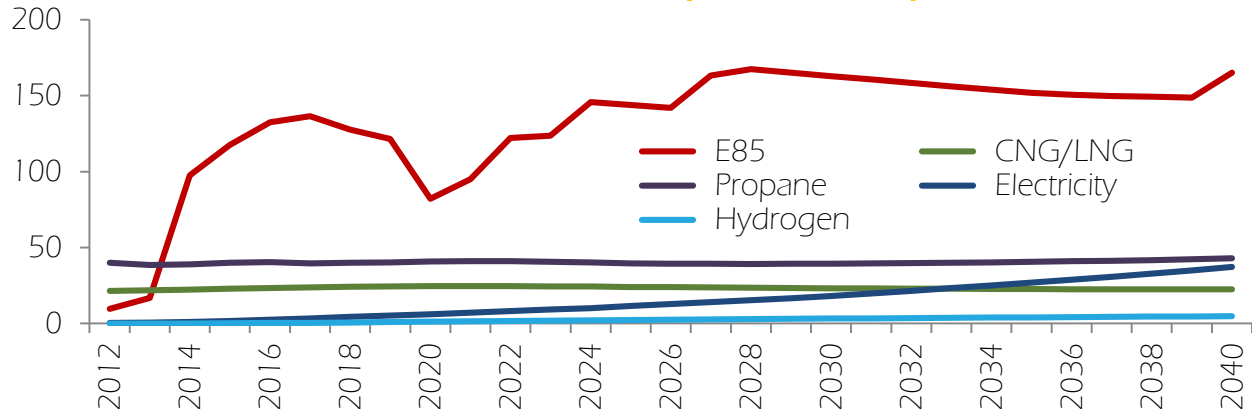


Alternative fuels will continue to make up a small share of total transportation fuel used in LDVs. Nevertheless, electricity and E85 use in LDVs is forecast to grow 17 percent and 4.3 percent, respectively, between 2011 and 2040, with E85 making up the majority of alternative fuel use (Figure 5).

⁶ Data in this section is sourced from the U.S. Energy Information Administration (EIA) Annual Energy Outlook 2013 (AEO13): <http://www.eia.gov/forecasts/archive/aeo13/index.cfm>

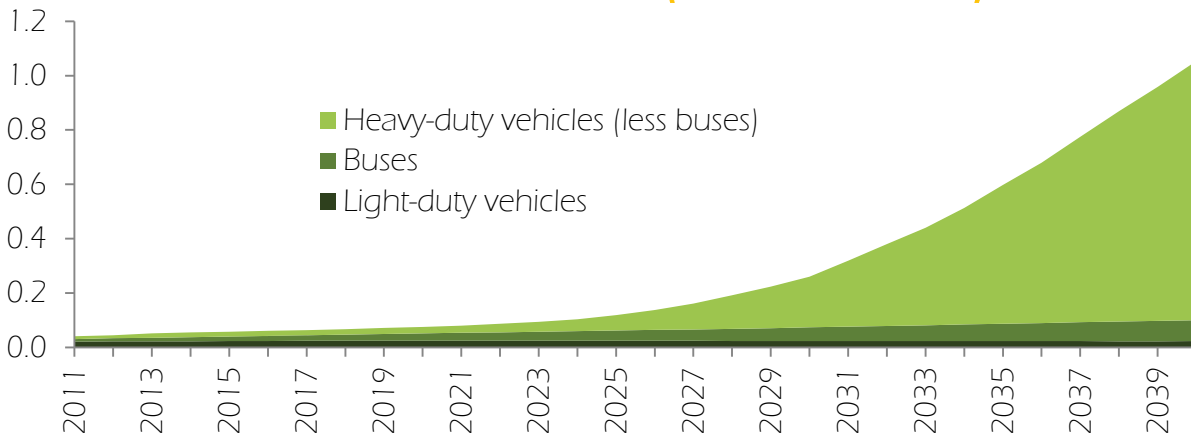
⁷ At the end of 2013, the spot price for oil was just above \$90 per barrel. Looking forward, world prices are projected to range anywhere between \$73 and \$235 a barrel by 2040, with \$160 as a reference case. [EIA (2013). *AEO13: Petroleum Product Prices*. Retrieved January 7 2013 from <http://www.eia.gov/forecasts/archive/aeo13/data.cfm?filter=oil#oil>]

FIGURE 5: FORECASTED LDV ALT. FUEL USE (TRILLION BTU)



In most heavy-duty vehicles (HDVs), diesel will remain the dominant fuel. However, natural gas use is forecast to grow faster than all other alternative fuels. **Figure 6** charts this growth. Among freight trucks, natural gas use will increase significantly (16.9 percent), with consumption overtaking propane around 2020 and going on to supply about 20 times more energy than propane by 2040. Natural gas will overtake diesel as the dominant fuel in transit buses by the early 2030s. Among school buses, diesel remains dominant, with relatively small amounts of demand met by natural gas and propane.

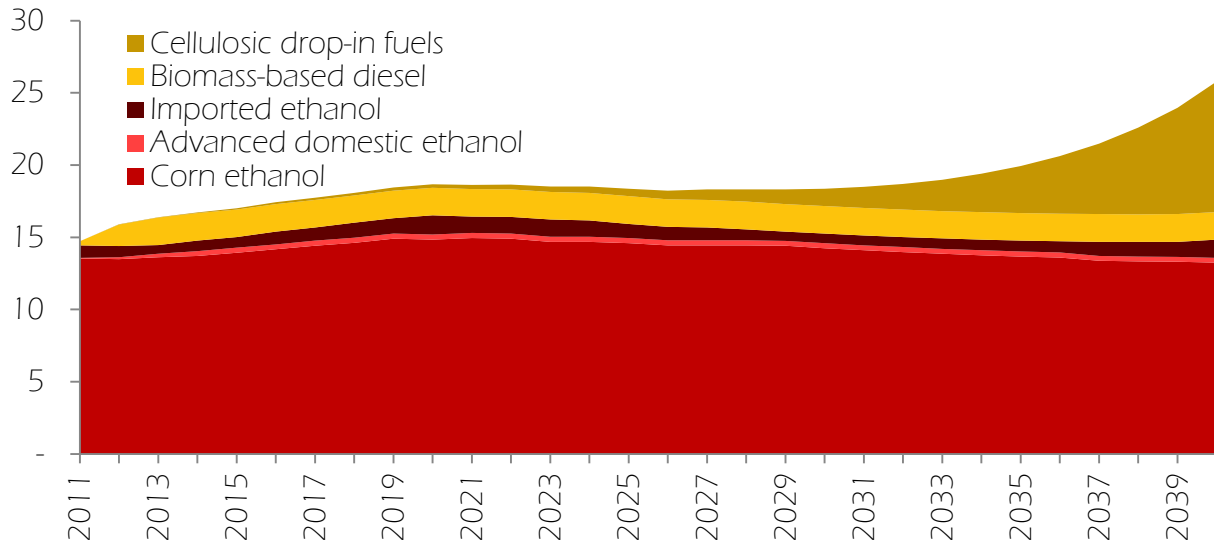
FIGURE 6: FORECASTED NATURAL GAS USE (QUADRILLION BTU)



Biofuel consumption is also forecast to grow, with bio-based diesel alternatives offsetting some diesel use in HDVs. However, consumption of most biofuels will decline after the 2020s as a result of Federal Renewable Fuel Standard (RFS) policies. The RFS sets standards for increasing the volume of biofuels blended into gasoline and diesel. Compliance with the standard is tracked via credits representing gallons of biofuels produced or imported. New federal policies developed between now and 2020 may affect this projection.

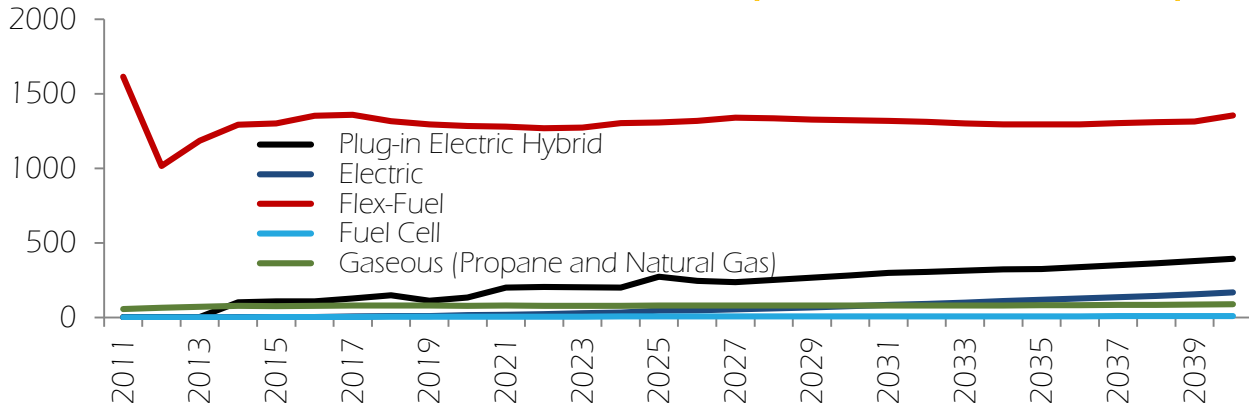
Figure 7 charts the production of biofuels, including E85 and biodiesel, in terms of RFS credits. It indicates that cellulosic drop-in fuels, which are not used in significant amounts today, account for the increase in biofuels in the latter years.

FIGURE 7: PROJECTED BIOFUELS PRODUCTION (BILLION EISA2007 RFS CREDITS EARNED)



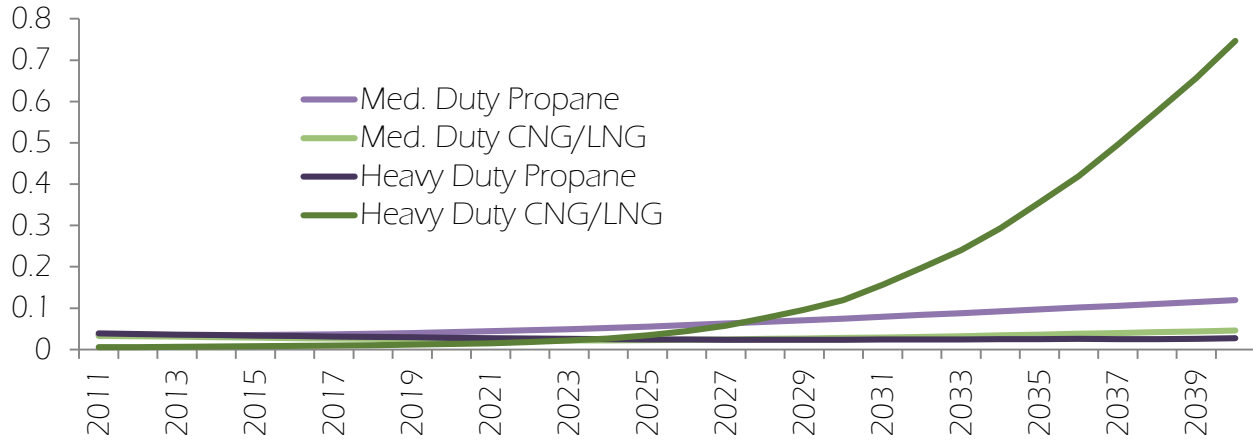
Demand for Alternative Fuel Vehicles is forecast to increase. In the LDV category, sales will grow from 20 percent of all new sales in 2011 to 49 percent in 2040. These vehicles will be dominated by flex fuel and “micro-hybrid” vehicles, which reduce ICE idling. Sales of gasoline- and diesel-hybrid electric vehicles, plug-in electric vehicles and electric vehicles will grow significantly. Within fleets with passenger cars and trucks up to 10,000 pounds (i.e. light-duty trucks), natural gas and propane vehicles will be favored, with electric vehicles also playing a significant role. **Figure 8** charts expected growth in AFVs in the LDV category. Hybrid vehicles, including micro-hybrids, which are not considered AFVs, are excluded from this chart, though they dominate sales.

FIGURE 8: FORECASTED LIGHT-DUTY AFV SALES (THOUSANDS OF VEHICLES)



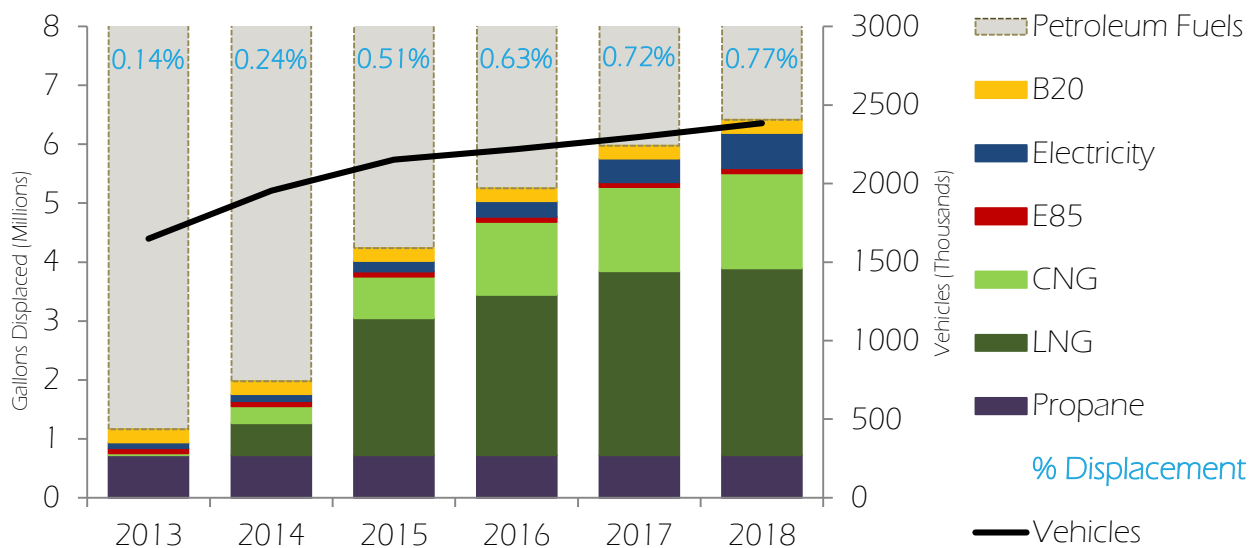
Among larger vehicles, natural gas and propane are projected to be the dominant AFV types. In the mid-size range, they are expected to account for between 1 percent and 2 percent of vehicles, respectively. Among HDVs, natural gas vehicles will be the dominant type, growing nearly 20 percent over the period to 10 percent of the HDV stock. **Figure 9** shows expected changes in medium and heavy duty AFVs. Note that conventional vehicles utilizing biodiesel blends are not included in the figure.

FIGURE 9: FORECASTED MEDIUM- AND HEAVY-DUTY AFV STOCKS (MILLIONS OF VEHICLES)



Although forecasts for alternative fuel use and vehicle adoption in North Florida are limited by available data, local developments will likely mirror national trends in many cases, based on existing and publically announced projects. In particular, use of natural gas appears to be poised for a dramatic increase over the next few years. **Figure 10** charts current and projected alternative fuel use in North Florida by fuel type. Data in this figure represent known and announced alternative fuel projects. **Section 8** of this Plan details on-going and projected projects in further detail. It does not include several recently announced rail and maritime projects. **Section 9** details strategies to expand the presence of petroleum alternatives in North Florida. **Section 10** lists projects being implemented to increase petroleum-displacement locally. These projects are included in **Figure 10**. However, no attempt has been made to forecast the effect of future efforts of the NFCFC and its stakeholders.

FIGURE 10: PROJECTED PETROLEUM DISPLACEMENT (GALLONS) BY FUEL AND ALTERNATIVE FUEL VEHICLES, 2013 – 2018





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4. FUELS

In this section, the sources, prices, energy content and emissions of alternative fuels are compared and contrasted. As noted in **Section 3**, alternative transportation fuels include biodiesel, electricity, ethanol, hydrogen, natural gas and propane. These fuels share in common the potential to significantly displace use of gasoline and diesel fuels. Otherwise, they are each very different, with unique characteristics that help determine their best use.

4.1. SOURCES

In 2012, about 40 percent of domestic consumption of petroleum was imported, with 65 percent coming from Canada, Mexico, Saudi Arabia, Venezuela and Russia; 40 percent from OPEC countries and 20 percent from Persian Gulf nations. Imports are expected to decline over the near term, but increase over the long term.⁸

Both gasoline and diesel are refined and distributed domestically. Florida has no petroleum refineries. They are imported primarily from refineries in Louisiana, Texas and Mississippi via tanker and barge. Jacksonville is one of the state's primary marine terminals for these imports, which are also received via Port Canaveral and Tampa.⁹

By contrast, alternative fuels are largely domestically produced and often locally distributed, providing a variety of potential benefits. The sources and distribution of alternative fuels is diverse, as indicated below. These differences have implications for the availability, price and environmental benefits of the various alternative fuels.

BIODIESEL

The sources of biodiesel are diverse, including first-generation and second-generation sources. First generation sources include primarily soybean oil, as well as rapeseed oil. Second-generation sources include vegetable oils and animal fats, often the waste products of food production or restaurants. Biodiesel is made at production facilities and shipped or trucked to fuel distributors. Distributors supply conventional retail gas stations. Biodiesel is also commonly produced locally and used on a small scale from secondary sources.

No large-scale production facilities are in North Florida, but six are within a 300 mile radius of Jacksonville, including three in Florida.¹⁰ The U.S. DOE Energy Information Administration reports an annual capacity of just 3 million gallons per year for the state, significantly less than neighbors. Biodiesel is produced on a small scale by St. Johns County using secondary sources. In the past, the County has produced up to about 250 gallons of biodiesel per day for exclusive use in its vehicle fleet.



⁸ U.S. Energy Information Administration, Annual Energy Outlook 2013, [http://www.eia.gov/forecasts/aeo/pdf/0383\(2013\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf)

⁹ Florida produced less than 6,000 barrels of oil per day and 18 billion cubic feet of natural gas in 2012. By contrast, the U.S. as a whole produced over 6 million barrels of oil per day and just under 24,500 billion cubic feet of natural gas in the same year.

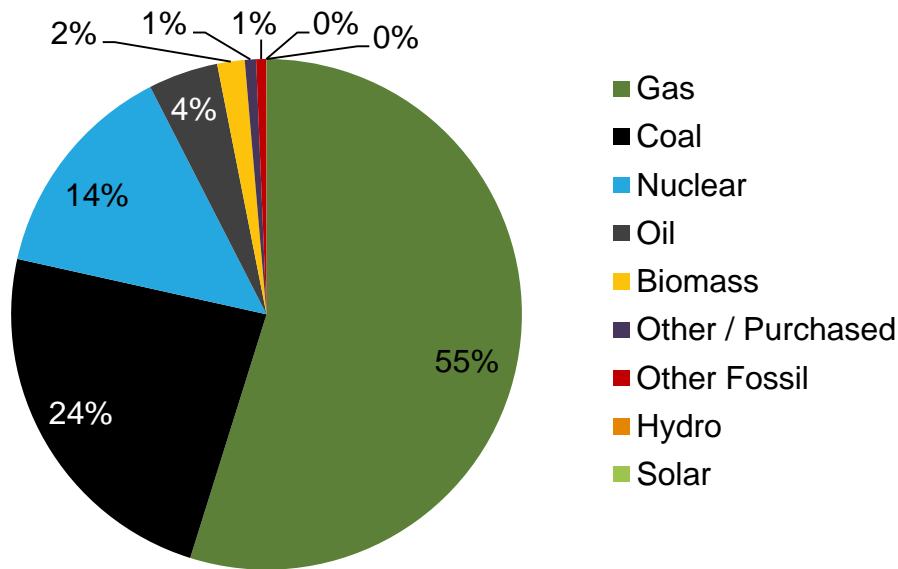
¹⁰ Producers listed in the National Biodiesel Board database located within 300 miles of downtown Jacksonville include: Down to Earth Energy, Inc. (Monroe, GA), Genuine Bio-Fuel (Indiantown, FL), GGS (Ft. Myers FL), Seminole Biodiesel (Bainbridge, GA), Southeast BioDiesel (North Charleston, SC) and Viesel Fuel, LLC (Stuart, FL)

While there are no distributors within the North Florida study area, both First Coast Biofuels in Lake City and Daytona Biofuels in Holly Hill are in close proximity. Presently, there are few retailers of biodiesel in North Florida. Pilot / Flying J stations are one. However, the ASTM standard for conventional diesel fuel allows biodiesel content of up to 5 percent without labeling the fuel as biodiesel. A private B20 fueling station is operated by Marine Corps Blount Island.

ELECTRICITY

Electricity used in EVs and PHEVs is primarily sourced from the electric grid. The grid is supplied, operated and maintained by a national network of electric utilities. The feedstocks that utilities use to produce electricity vary widely across the nation, ranging from coal to hydroelectric power. Their share of electricity production constantly changes in response to economic, regulatory, technological and logistical factors, among others. In North Florida, electricity is produced locally by JEA and Florida Power and Light. It is distributed to end-users by JEA, Beaches Energy, Clay Electric, Florida Power and Light and the City of Green Cove Springs. The sources of Florida’s electricity are shown in **Figure 11**, according to data reported from utilities to the U.S. Environmental Protection Agency in 2009 and reported by the EPA to the public in 2012.

FIGURE 11: FLORIDA ELECTRIC PRODUCTION RESOURCE MIX, 2009¹¹



E85

As with biodiesel, the potential sources of ethanol are diverse, including starch- and sugar-rich plants traditionally grown as food sources and non-food plants. Corn is the dominant source of ethanol in the United States. Non-food feedstocks are commonly referred to as “cellulosic,” since chemical processes are used to convert plant cellulose into fuel. Cellulosic feedstocks require fewer resources to grow, but technological and economic barriers have limited commercial-scale production.

¹¹ EPA. (2012). eGRID2012 Version 1.0 Year 2009 Summary Tables. http://www.epa.gov/cleanenergy/documents/eGRID2012V1_0_year09_SummaryTables.pdf

Historically, there has been no significant ethanol production in Florida. However, several private cellulosic ethanol projects have received state funding in recent years, which may result in increased domestic production. Ethanol is distributed by First Coast Biofuels in Lake City. The City of Jacksonville operates a private E85 fueling station for use in the Jacksonville Sheriff's Office Fleet. At present, there are few retailers of E85 in North Florida.

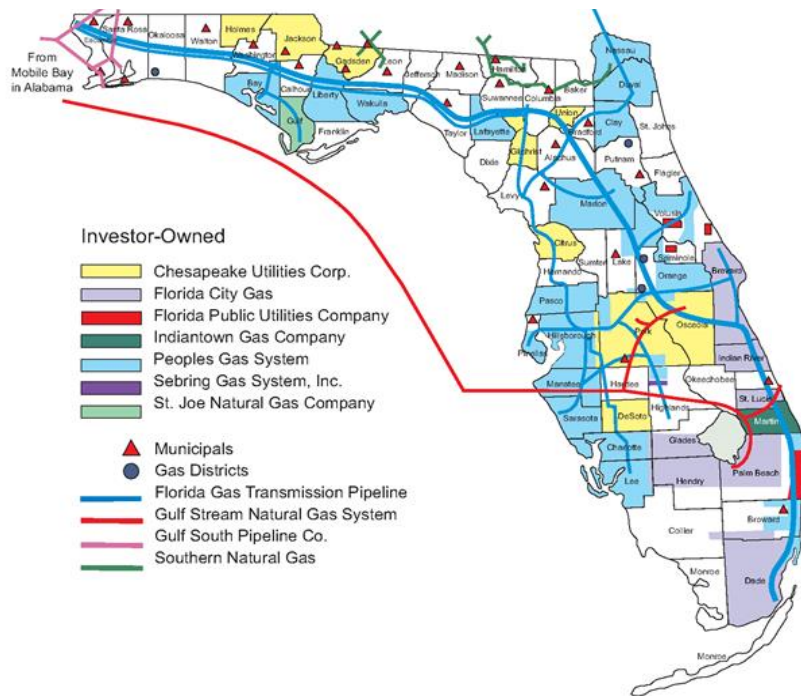
HYDROGEN

Hydrogen is currently produced domestically through steam reforming of natural gas. Electrolysis is a less-used method. Research on cleaner and more efficient methods of producing hydrogen is on-going. Hydrogen is primarily used in industrial applications, where it is typically produced on site. It can be distributed via pipeline, tankers, rail and truck via high pressure or cryogenic containers. However, infrastructure for producing and delivering hydrogen to support the transportation sector does not presently exist in the U.S. There are no sources for hydrogen for use in vehicles in North Florida.

NATURAL GAS

Natural gas is largely produced domestically. An extremely small amount is produced in Florida, with the raw gas processed out of state that reaches North Florida via an interstate network of transmission pipelines (Figure 12).

FIGURE 12: EXISTING NATURAL GAS TRANSMISSION PIPELINES IN FLORIDA



In the past, these pipelines have predominately transmitted gas from production centers in Louisiana, Texas and Mississippi. Existing pipeline connections to the north, as well as new pipeline projects, are expected to allow Florida to diversify its sources by connecting it to shale gas producers in the Midwest.

At the local level, natural gas is distributed to end-users via TECO People Gas, which operates and maintains a gas distribution network.

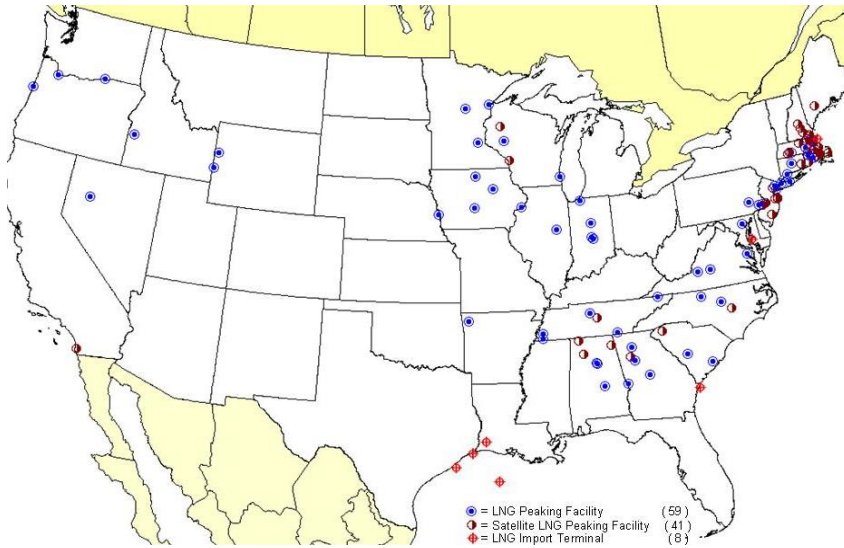


FIGURE 13: CURRENT LNG LIQUEFACTION, STORAGE AND IMPORT FACILITIES

Natural gas is compressed or liquefied for use in transportation. Compressed Natural Gas is produced near the end-use. Natural gas supplied by the local distributor is dried, filtered and compressed to about 3,600 pounds per square inch for dispensing to vehicles.

LNG is produced regionally in liquefaction plants (Figure 13). The majority of these facilities have been designed to support export of natural gas or to meet spikes in

demand for home heating. A small minority produce LNG for transportation uses, although this number is expected to grow. In liquefaction plants natural gas is purified and cooled to -260°F. It is then trucked to fueling stations, where it is stored on site. LNG may be converted to CNG at such sites.

Presently, there are no LNG production, storage or import / export facilities in Florida. However, several projects have been announced for North Florida. More detail on CNG and LNG fueling stations is provided in **Section 6: Infrastructure**.

PROPANE

Propane is produced by gulf state refineries as a by-product of oil refining or natural gas processing. The portion of propane ultimately sourced from domestic or foreign oil is not possible to ascertain. Ultimately, the fuel is transported by rail and/or truck to bulk storage plants, which deliver propane to wholesale and retail customers. There are over 13,000 such plants in the U.S. In North Florida over eight retailers of propane are available for use in vehicles. More detail on propane fueling stations is provided in **Section 6: Infrastructure**.

4.2. ENERGY CONTENT

Because alternative fuels take a variety of forms ranging from liquid to gas, it is challenging to compare alternative fuels on a common basis. The energy content of the fuels varies significantly. This influences the cost to operate AFVs and infrastructure relative to conventional options. **Table 2** summarizes the heat content of petroleum and alternative fuels in their most common unit of consumption. It also compares them on a gasoline gallon equivalent (GGE) and diesel gallon equivalent (DGE) basis.

In **Table 2** gasoline, diesel, biodiesel, E85, hydrogen, LNG and propane are all evaluated on a per gallon basis. Electricity is evaluated on a per kilowatt-hour basis and CNG on a per Therm basis. Electricity is a non-volumetric energy “carrier” produced from other feedstocks (e.g. coal, natural gas, etc.). CNG is a gas. CNG and LNG are often retailed on a GGE or DGE basis.

**TABLE 2: ENERGY CONTENT COMPARISON OF TRANSPORTATION FUELS¹²**

Fuel (unit)	Heat Content (BTU / unit)	GGE	DGE
Gasoline (gal)	115,400	1.00	0.88
Diesel (gal)*	127,500	1.14	1.00
B100 (gal)	117,000	1.05	0.92
B20 (gal)	104,000	1.12	0.98
Electricity (kWh)	3,412	0.31	0.27
E85 (gal)	76,000	0.73	0.64
Hydrogen (gal)	27,800	0.25	0.22
CNG (Therm)	93,000	0.83	0.73
LNG (gal)	71,000	0.64	0.56
Propane (gal)	83,500	0.74	0.65

*Ultra-low sulfur diesel, 10 ppm sulfur

4.3. PRICES

Table 3 compares the current average price of alternative fuels to gasoline and diesel. The data is through April 2014 for the Lower Atlantic Region.¹³ Local prices may differ. Prices are shown in dollars per gallon (gal), dollars per GGE and dollars per DGE.

When comparing prices of alternative fuels, it is important to understand the basis of comparison. Comparisons based on price per gallon alone do not account for the different energy content of fuels.

TABLE 3: CURRENT AVERAGE PRICES OF FUELS (APRIL 2014), LOWER ATLANTIC REGION¹⁴

Fuel	\$/gal	\$/GGE	\$/DGE
Gasoline	\$3.56	\$3.56	\$3.97
Diesel	\$3.97	\$4.43	\$3.97
B20	\$3.93	\$3.59	\$4.01
B100	\$4.06	\$4.00	\$4.46
Electricity	*	*	*
Hydrogen	**	**	**
E85	\$3.23	\$4.92	\$5.49
CNG	\$2.07	\$2.07	\$2.31
Propane	\$3.16	\$4.37	\$4.87

*Electricity is sold on a per kilo-watt basis not directly comparable to volumetric measures such as gallons.

**Prices for hydrogen are not currently tracked.

Other factors play a role in comparing the prices of fuels. Biodiesel is produced, distributed and retailed regionally at a commercial scale. The national average price for this kind of production is shown in Table 3. Biodiesel may also be produced locally on a small scale. Table 3 does not reflect the price of this kind of production, which can be substantially lower. Prices for hydrogen

¹² Sources: U.S. DOE (2013) Clean Cities Alternative Fuels Price Report; California Energy Commission (2007). Full Fuel Cycle Assessment Well to Tank Energy Inputs, Emissions and Water Impacts, U.S. DOE. (2010). Transportation Energy Data Book, 30th Ed.

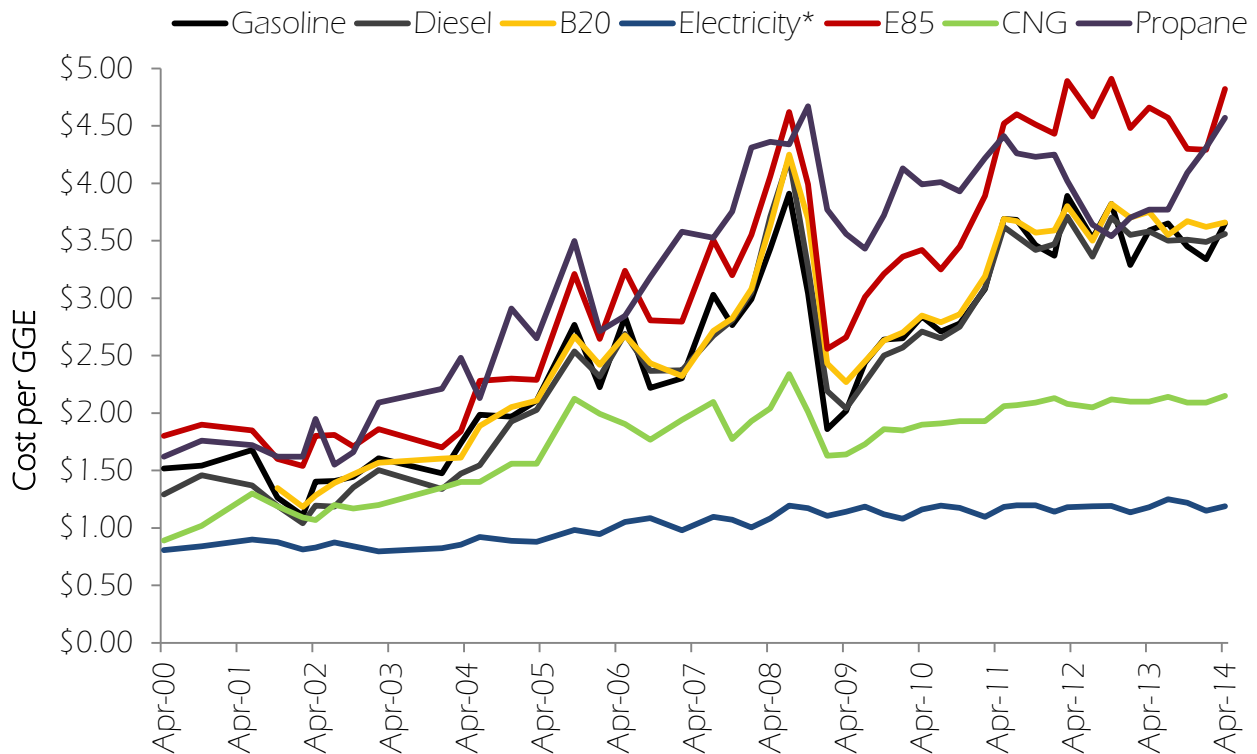
¹³ The Lower Atlantic Region includes Florida, Georgia, South Carolina, North Carolina, Virginia and West Virginia.

¹⁴ Source: U.S. DOE. (2013). Clean Cities Alternative Fuels Price Report. <http://www.afdc.energy.gov/fuels/prices.html>

and LNG are not yet widely tracked and are not included in the U.S. Department of Energy’s reports. LNG prices are generally higher than CNG prices but lower than diesel prices. Electricity is sold on a per-kilowatt-hour (kWh) basis rather than a per gallon basis, making direct comparisons between the price of electricity and gasoline difficult. However, the cost to charge an electric vehicle is significantly less than the cost to fuel a comparable gasoline vehicle.¹⁵ Propane / Autogas prices are typically established via a private contract. While prices vary according to contract terms, these prices are anecdotally significantly lower than gasoline or diesel.

Figure 14 charts the average retail price of alternative fuels relative to gasoline and diesel over the past 14 years. Prices are presented in terms of dollars per gaseous gallon equivalent (GGE). The chart indicates that the prices for biodiesel, ethanol have generally been similar to diesel and gasoline on a GGE basis. These fuels have exhibited volatility comparable to gasoline and diesel in the past, since the demand for alternative fuels tends to rise as the price of conventional fuels increase. CNG and electricity have been less expensive than diesel and gasoline on a GGE basis. They have exhibited less volatility, since demand for these fuels for transportation purposes is small compared to other end-uses.¹⁶

FIGURE 14: U.S. AVERAGE RETAIL FUEL PRICES, 2000 – 2014



*Electricity prices reduced by a factor of 3.4. An electric motor is approximately 3.4 times as efficient as an ICE.

¹⁵ Currently, electric vehicles travel approximately 0.25 miles per kilowatt hour. With a North Florida regional average electric rate of about \$0.12 / kWh in 2012, an owner might spend about \$0.03 per mile on electricity to operate an EV. By comparison, the gasoline to operate a gasoline vehicle at 24.6 miles per gallon would cost about \$0.13 per mile.

¹⁶ The price of natural gas is increasingly a major component of electricity costs as the nation’s electric utilities shift the source of power production from coal to natural gas.

4.4. EMISSIONS

Alternative fuel vehicles have the potential to reduce pollution in the transportation sector, including air pollution and greenhouse gas emissions.

Air pollution from transportation includes Criteria Air Pollutants regulated by the Clean Air Act that include Oxides of Nitrogen (NO_x), Carbon Monoxide (CO), and Particulate Matter (PM). Some pollutants, together with Volatile Organic Compounds (VOC), can form ground-level ozone that can have significant health and environmental effects, ranging from asthma to acid rain. Several federal programs, including the Congestion Mitigation and Air Quality Improvement (CMAQ) Program, are aimed at reducing air pollution from transportation.



Greenhouse gas (GHG) emissions, including releases of Carbon Dioxide (CO₂), are also closely linked to transportation. The transportation sector is the second largest source of anthropogenic (i.e. “human-caused”) emissions in the U.S., or nearly 30 percent of the total. Anthropogenic GHG emissions are a leading cause of climate change, which will likely present significant challenges to the economy and society going forward.

To evaluate air pollution and GHG reduction benefits of alternative fuels and vehicles, both fuel production and vehicle operation must be considered. Petroleum, natural gas, coal, biomass and electricity are feedstocks used to produce fuel. Each has a different impact on air quality and GHG emissions. These fuels may be utilized by a variety of transportation technologies, ranging from ICEs to fuel cell vehicles. Assessing both fuel production and vehicle operation technologies allows a common comparison between the fuels.

AIR QUALITY

Increasingly stringent emissions regulations are leading to improved emissions control systems in conventional light and heavy duty vehicles after the 2010 model year. Since these technologies are commonly applied after combustion, air quality from transportation is expected to improve regardless of fuel or efficiency of vehicles. Nevertheless, several alternative fuels can help improve air quality further. A few alternative fuels may have a negative effect on air quality relative to standard fuels. These characteristics are summarized in **Table 4**. It shows [percent reductions](#) (or [increases](#)) relative to standard vehicle emission rates (in grams per mile).



Using biodiesel can improve air quality relative to conventional diesel fuel. Some studies indicate that the slight increase in NO_x emissions indicated in **Table 4** may be closer to zero. Meanwhile, advances in diesel emissions control technologies may reduce differences between alternative and conventional fuels and vehicles in the future.

TABLE 4: ESTIMATED AIR QUALITY EMISSIONS OF ALTERNATIVE FUELS RELATIVE TO CONVENTIONAL FUELS¹⁷

Fuel / Technology	NOx	VOC	CO	PM10
Biodiesel	+3%	-20%	-10%	-8%
Electricity (EV) ¹⁸	-96%	-96%	-96%	-11%
Ethanol	+8%	+2%	0%	+1
Hydrogen	-96%	-96%	-96%	-1 to -11%
Natural Gas (CNG)	-19 to 0%	-72%	*	*
Natural Gas (LNG)	-5% to +4%	-72%	*	-1 to -2%
Propane	+3 to +26%	+600%	0%	0%

*Data not available

Electric vehicles have no tailpipe emissions. The relative air quality quantities shown in **Table 4** for electric vehicles are predominantly the result of electricity generation rather than vehicle operation. PHEV and gasoline or diesel / electric hybrids (HEV) reduce emissions less than EVs, since a portion of their operation is conducted in a conventional mode. For EVs and PHEVs, emissions are highly dependent on the fuels utilized by local electric utilities to generate power.

As with electric vehicles, hydrogen vehicles have no significant tailpipe emissions. PM emissions are mainly the result of the source of electricity used hydrogen production.

The air quality benefits associated with natural gas vehicles are higher for passenger vehicles than for heavy duty vehicles. Benefits for LNG are slightly smaller than for CNG due to the energy used in processing the fuel.

Ethanol is notable for having a negative effect on air pollution relative to gasoline. This is a result of emissions that occur during feedstock farming and ethanol production. There is relatively little variation in emissions among the various potential ethanol feedstocks (e.g. corn, sugar cane, cellulosic, etc.). Importantly, most emissions associated with this fuel occur outside urban areas. As a result, using ethanol in an urban context, where air pollution is typically more severe, may still have beneficial effects.

Propane is notable for significantly increasing VOC emissions relative to conventional fuels. This is primarily a result of venting from storage tanks. Currently there is no regulation for limiting venting losses. Increases in NOx are much smaller if propane is sourced as a by-product of petroleum refining rather than natural gas production.

¹⁷ TIAX, LLC (2007) Fuel Cycle Assessment: Well-to Wheels Energy Inputs, Emissions, and Water Impacts, Retrieved January 20, 2014 from: <http://www.energy.ca.gov/2007publications/CEC-600-2007-004/CEC-600-2007-004-F.PDF>

¹⁸ Table 4 reflects conditions in California, which is among the “cleanest” grids in the United States. The air quality benefits of electric vehicles in North Florida may be expected be less than those shown in Table 3.

GHG EMISSIONS

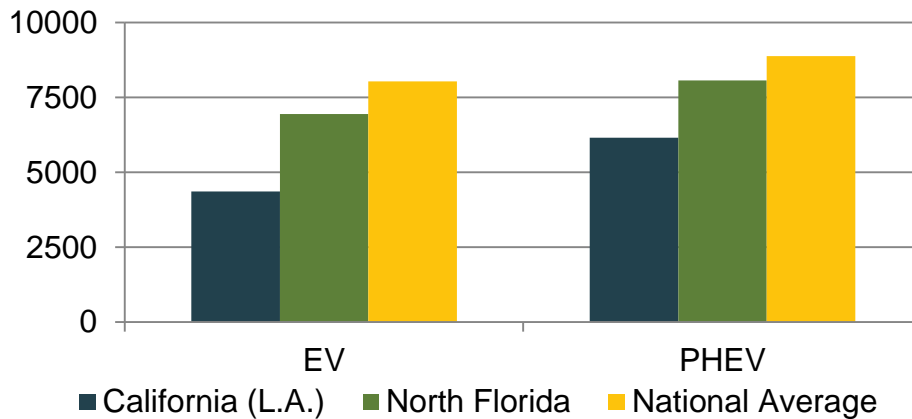
All alternative fuels / technologies are expected to reduce GHG relative to conventional petroleum-based fuels. **Table 5** summarizes the relative rate of GHG emissions (i.e. grams per mile) of alternative fuels relative to gasoline or diesel. The data presented in this table are sourced from a study of alternative fuels commissioned by the California Energy Commission based on conditions in that state.¹⁹

TABLE 5: ESTIMATED GHG EMISSIONS OF ALTERNATIVE FUELS RELATIVE TO CONVENTIONAL FUELS

Fuel / Technology	GHG
Biodiesel	-10 to -13%
Electricity	-48 to -72%
Ethanol	-15 to -28%
Hydrogen	-26 to -91%
Natural Gas (CNG)	-11 to -30%
Natural Gas (LNG)	-11 to -16%
Propane	-18 to -20%

As with air quality emissions, GHG emissions from EVs are related to the fuel mix of local electricity generators. PHEVs and HEVs reduce emissions less than EVs when operated in the conventional fuel mode. **Table 5** displays the range of emissions reductions expected for EVs operating on the California grid. In Florida, EV emissions are likely to be higher than California, but less than the national average. **Figure 15** shows how EV and PHEV emission rates in Florida would compare to the national average and to Los Angeles, CA. The table suggests that EVs in Florida could reduce emissions by about 47 percent relative to a conventional gasoline vehicle.

FIGURE 15: REGIONAL COMPARISON OF EV EMISSIONS (ANNUAL LBS CO2e PER VEHICLE)



GHG emissions from ethanol are highly dependent on the feedstock. In the U.S. the predominant feedstock is corn, which is less efficient than sugar-cane or cellulosic (e.g. non-food) sources. Both changes in corn-based ethanol farming techniques and developing

¹⁹ TIAX, LLC (2007) Fuel Cycle Assessment: Well-to Wheels Energy Inputs, Emissions, and Water Impacts, Retrieved January 20, 2014 from: <http://www.energy.ca.gov/2007publications/CEC-600-2007-004/CEC-600-2007-004-F.PDF>

alternative domestic feedstocks could drive improvements in the GHG emissions profile of ethanol.

Like ethanol, GHG emissions from hydrogen are highly dependent on the source. The greatest emission reductions are from hydrogen produced with renewable electricity (e.g. solar or wind) or biomass, neither of which is widely used for this purpose. Natural gas is currently the primary source. Hydrogen produced from conventional electricity is the least beneficial production method.

Opposite from the case with air emissions, higher GHG reductions result from propane sourced from natural gas versus petroleum.



5. VEHICLES

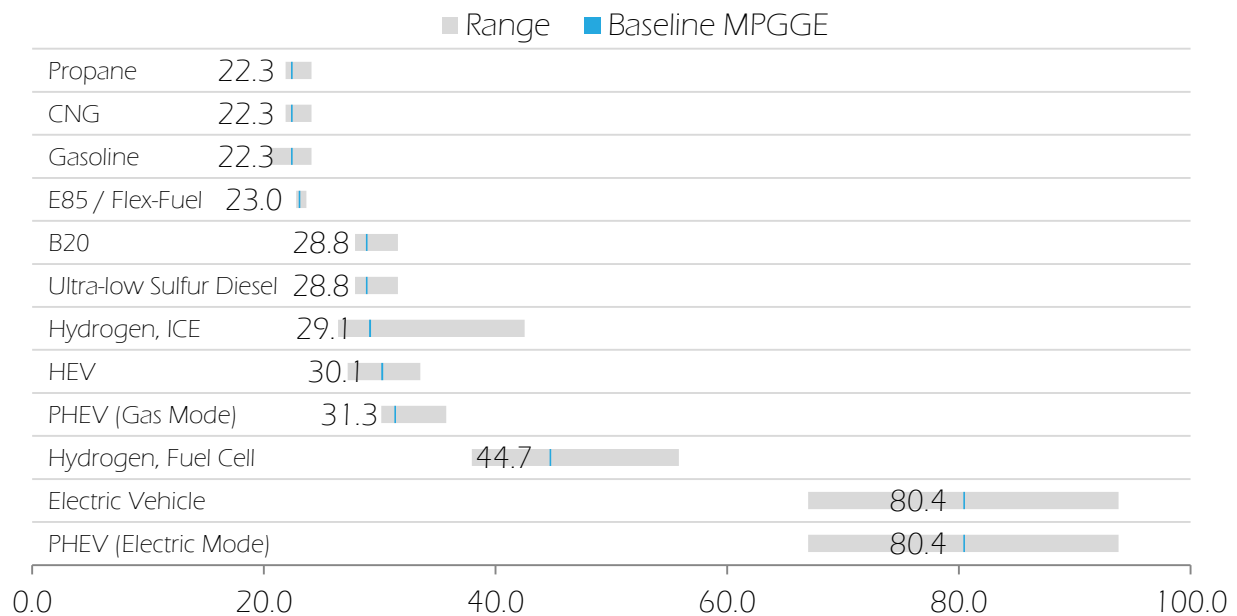
Vehicles that utilize alternative fuels are diverse. Some differences are the result of the fuels themselves, others the technologies that utilize them. The differences lead to end-use applications for which certain alternative fuel vehicles may be more appropriate than others, based on operational and economic considerations. In this section, several of the most important characteristics of AFVs are compared and contrasted, including fuel economy, range, cost and availability of vehicles.

5.1. FUEL ECONOMY

As shown in [Section 4.3](#), the energy content of alternative fuels varies. The efficiency with which AFVs convert energy into motion also differs. These differences have implications for the applications in which AFVs are most appropriate.

Figure 16 compares the energy efficiency (i.e. “fuel economy”) of mid-size, light-duty vehicles, including several AFVs. Efficiency is measured in miles per gasoline gallon equivalent (MPGGE). The energy efficiency of differently-sized cars varies but the relative differences are similar. The figure indicates that EVs are the most efficient by a significant margin, followed by hydrogen fuel cell vehicles. Vehicles operating on diesel and B20, as well as gasoline / electric hybrids and hydrogen internal combustion engine vehicles follow. E85, propane and CNG vehicles are similar to standard gasoline vehicles.

FIGURE 16: ENERGY EFFICIENCY OF MID-SIZE, LIGHT DUTY VEHICLES



The relative energy efficiencies of heavy duty vehicle technologies are shown in [Table 6](#). Values are presented in terms of Energy Economy Ratios (EER). EER is a ratio of the fuel economy for AFVs to baseline diesel fuel economy (i.e. the EER for diesel is 1). There is little variation in the efficiency of AFVs relative to conventional HDVs. [Table 6](#) indicates that CNG, LNG and Autogas vehicles are slightly less efficient than a conventional diesel vehicle, while B20 vehicles have essentially similar fuel economy.

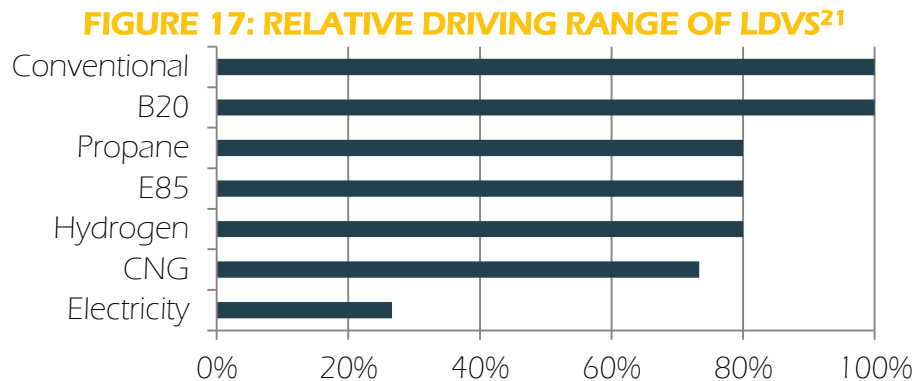
TABLE 6: ENERGY EFFICIENCY OF HEAVY DUTY VEHICLES

Technology	EER
LNG	0.93
Propane	0.94
CNG	0.94
Diesel	1
B20	1
Hybrid, Gasoline	1.1
Hydrogen, ICE	1.1
Hybrid, Diesel	1.25
Hydrogen, Fuel Cell	1.5
EV	2.7

5.2. RANGE

Range is the distance a vehicle can travel between fueling. Manufacturers attempt to optimize AFVs to have a driving range as close as feasible to conventional vehicles. Conventional LDVs, for example, have a range of about 300 miles. As with some AFVs, the range of conventional heavy-duty vehicles is largely determined by weight, including the amount of fuel carried on-board. This varies considerably according to the vehicle application. The size and weight of some alternative fuel tanks can limit AFV range.

Household-based use of vehicles is composed of short trips. Drives of 100 or more miles account for less than 1 percent of total trips and 15 percent of total miles travelled.²⁰ Commercial use is varied. For many fleets, range is a primary operational factor. **Figure 17** provides a generalized relative comparison of driving ranges of light-duty vehicles.



B20 has energy content similar to conventional diesel and is used in conventional vehicles. As a result, range is comparable.

The range of EVs depends on battery capacity. Present battery technology limits the range of EVs to far less than conventional vehicles – about 70 miles depending upon several factors.

²⁰ FHWA. (2008). Percent of Trips and Vehicle Miles by Trip Length. Retrieved 2/20/14 from http://www.fhwa.dot.gov/policyinformation/pubs/pl08021/fig4_5.cfm

²¹ The driving range of propane, hydrogen and CNG vehicles is dependent on the size of on-board tanks, among other factors. Manufacturers attempt to optimize tank size to reduce range losses.

PHEVs have been developed, in part, to address “range anxiety” inherent with current EV technology. Advances in battery technology and lightweight materials will extend the range of EVs significantly in the near future.

Ethanol contains about 73 percent of the energy contained in conventional gasoline. Used in flex fuel vehicles, which are not optimized to take advantage of its higher octane, E85 reduces range by 15 percent – 25 percent.

Range affects the two primary natural gas fuels differently. Natural gas is less energy dense than gasoline or diesel, resulting in reductions in driving range. For both CNG and LNG vehicles, manufacturers attempt to optimize the size of fuel storage tanks to reduce range losses. However, the amount of CNG that can be stored on-board a vehicle is limited by available space and weight. It is also affected by ambient temperature and the speed with which the tank is filled. The result can be reduced range of about 25 percent. For example the Honda Civic CNG has a range of 220 miles. Heavy-duty CNG vehicles are commonly used in applications in which range is not a primary concern. In a liquid state, natural gas contains more energy. As a result, the range of LNG vehicles is higher than CNG vehicles. LNG vehicles can have a range of beyond 300 miles, making them a feasible choice for long-range heavy-duty applications.²²



Propane is less energy dense than conventional fuels. As a result, range can be reduced by 15 – 25 percent. As with natural gas vehicles, manufacturers attempt to size propane tanks to reduce range losses and are often successful in design vehicles with range comparable to conventional vehicles.

The range of hydrogen vehicles is also defined by the storage capacity of on-board tanks. Since it is an extremely low density gas, storing sufficient quantities onboard has been one of the main technological barriers to commercializing hydrogen vehicles. The Honda FCX, for example, has a range of 240 miles.

5.3. COST

Most AFVs have higher purchases / lease prices than conventional vehicles. B20 and E85 vehicles are exceptions. The reason for higher prices relate to technologies specific to AFVs. Examples include batteries used in EVs and reinforced fuel tanks used in CNG vehicles. These price premiums limit adopting AFVs and using alternative fuels. As a result, a variety of incentives aimed at defraying the cost of certain AFVs exist. **Section 7** details these incentives. Many AFVs exhibit favorable returns on investment after considering fuel consumption, fuel price, and incentives. As production volumes of AFVs increase and technologies advance, costs are expected to go down for all AFVs.

²² As LNG warms, it returns to a gaseous state and must be vented to the environment. Consequently, it must be consumed within a relatively short time frame.

Table 7 qualitatively summarizes the relative price premiums associated with AFVs.

TABLE 7: RELATIVE PRICE PREMIUM FOR AFVS

Fuel / Technology	Premium
B20	None
Electricity	Moderate
E85	None
Hydrogen	High
CNG	Low
LNG	Moderate
Propane	Low

Conventional diesel vehicles can operate on B20. Consequently, there is no vehicle price premium. Blends higher than B40 likely require vehicle modifications that imply moderate investment. E85 / Flex Fuel vehicles carry little or no price premium as well.

The cost to convert a conventional truck to Autogas ranges from \$4,000 - \$12,000. Electric vehicles carried a premium of about \$10,000 on average in 2012, with a higher premium for PHEVs. However, several manufacturers have recently announced significant price reductions. The Honda Civic CNG carries a price premium of about \$7,500. General Motors recently announced bi-fuel CNG vehicles at \$11,000 premiums. For heavy duty vehicles premiums range from about \$50,000 for a CNG bus to \$90,000 for a LNG tractor-trailer.

Hydrogen vehicles are not widely available (See **Section 5.4**). They are expected to carry a very high price premium. For example, the Honda Clarify FCX is leased at \$600 per month, while a Honda Civic is available for \$160 per month.

5.4. AVAILABILITY

Availability of AFVs has been a limiting factor in the past. However, AFVs are now available for nearly every conceivable automobile application. Auto manufacturers are expected to continually expand their offerings of AFVs. There is wide variation in availability of vehicles between the various alternative fuels. For instance, any diesel vehicle can utilize B20, while no hydrogen light-duty vehicles are available in the North Florida market.

In the light-duty category, OEMs produce dedicated AFV models. In addition, many companies offer standard alternative fuel modifications of OEM vehicles. In the HDV category, the situation is more complex. AFVs are available from OEMs in standard models in much the same manner as LDVs. There are also discrete or integrated manufacturers of chassis, engines, or fuel systems that specifically accommodate alternative fuels. A multi-stage manufacturing process involving these systems can be used to produce a wide array of AFV configurations aimed at various applications. As a result, heavy-duty AFVs can be customized to meet most needs. After-market conversions are also widely available.

BIODIESEL

All light- and heavy-duty diesel vehicle and engine manufacturers approve use of B5. In the past, few manufacturers approved use of B20. This has changed. All “Big 3” manufacturers now offer truck and van options.²³ Choices are fewer in the passenger vehicle category, with only the Chevrolet Cruze sedan approved for B20. Blends of 20 percent and higher are commonly used in vehicles. However, doing so may affect OEM warranties and service agreements.

In the heavy duty market, engine manufacturers certify use of B5 in standard models and some also certify use of B20. Anecdotally, higher blends are used in warm weather without modification, though warranties and service agreements may be affected. Diesel-electric hybrid vehicles are also increasingly available. A relatively wide variety of school buses, shuttle buses, transit buses, refuse trucks, tractors and vocational (i.e. package, beverage distribution, and lift) trucks are offered.

ELECTRICITY

In the 2014 model year, EVs are available from most auto manufacturers, with some available only in limited markets. A similar variety of PHEVs are offered. **Table 8** summarizes these options. A broader range of hybrid gasoline / electric vehicles are in production.

TABLE 8: ELECTRIC VEHICLE AVAILABILITY FOR MODEL YEAR 2014

Make	Model	Technology
BMW	i3	EV
	i3	PHEV
	i8	PHEV
Cadillac	ELR	PHEV
Chevrolet	Spark	EV
	Volt	PHEV
Fiat	500e	EV
Ford	Focus Electric	EV
	C-MAX Energi	PHEV
	Fusion	PHEV
Honda	Fit EV	EV
	Accord	PHEV
Kia	Soul EV	EV
McLaren	P1	PHEV
Mercedes-Benz	B-Class Electric	EV
Mitsubishi	i-MiEV	EV
Nissan	Leaf	EV
Porsche	Panamera S E-Hybrid	
Scion	iQ EV	EV
Smart	fortwo electric drive	EV
Tesla	Model S	EV
Toyota	RAV4 EV	EV
	Prius	PHEV

²³ The following B20 approved vehicles are available in 2014 models: Chevrolet Cruze sedan, Silverado (2500/3500) truck and Express van; GMC Sierra (2500/3500) truck and Savana (2500/3500) van; Ford Super Duty F-250 through F-750, Transit; Ram 2500/3500.

In the heavy duty market, full electric vehicles are well represented. School buses, transit buses, tractors, large vans, and vocational trucks (e.g. delivery trucks) are available. Diesel, CNG and hydrogen / electric hybrids are also increasingly available.

ETHANOL

Conventional gasoline vehicles are capable of running on ethanol blends up to 15 percent. In fact, most gasoline consumed in the United States includes up to 10 percent ethanol as an oxygenate.

Flex fuel vehicles are designed to run on gasoline or ethanol blends up to 85 percent. Nearly 100 flex fuel light-duty vehicle models are available for 2014. SUVs and trucks are particularly well represented in this category, as are domestic passenger vehicles traditionally marketed to municipal fleets.



In the heavy duty market, conventional gasoline vehicles are capable of running on ethanol blends up to 15 percent. However, diesel fuel generally predominates in this category. Ford's E-Series cutaway and stripped chassis are available for vocational applications.

HYDROGEN

Light-duty hydrogen vehicles are generally not available commercially. A small number of hydrogen Fuel Cell vehicles are produced by Honda (FCX Clarity) and Mercedes-Benz (B-Class F-Cell) in areas with access to fueling stations. Hydrogen is better represented in the heavy-duty sector. Shuttle buses and transit buses are offered by a few manufacturers. Hydrogen / electric hybrid transit buses and tractors are also available.

NATURAL GAS

In the light-duty market, natural gas options remain limited but are growing.

The Honda Civic CNG is the only available passenger vehicle. GM provides Chevrolet Express and GMC Savanna vans. Bi-fuel vehicles are offered by GM and Chrysler. The Silverado/Sierra 2500HD and Ram 2500 CNG trucks automatically switch between CNG and gasoline fuels. Several Ford, GM and Chrysler car, truck and van models are available for after-market modification that may not invalidate OEM warranties.



In the heavy duty market a wide variety of school buses, shuttle buses, transit buses, refuse trucks, tractors, large vans and vocational trucks (i.e. street sweepers, dump trucks, package trucks and cement trucks) are manufactured to run on CNG. Transit and refuse truck offerings are particularly diverse. In the transit bus category a CNG / electric hybrid is also available. Some LNG transit buses, refuse trucks, large vans, and vocational trucks are available. A wider variety of LNG tractors are manufactured.

PROPANE

OEM offerings of propane vehicles are expected to grow over the next several years. GM provides propane options for its Chevrolet Express and GMC Savanna vans. Ford offers F-250 and F-350 vehicles. After-market modifications of several Ford trucks and vans are available without affecting OEM warranties.



In the heavy-duty market, Ford F-450 through F-460 trucks are available via after-market modifications. Several manufacturers make propane powered school and shuttle buses. A smaller variety of tractors, large vans and vocational trucks (i.e. package trucks) are also available.

In addition to on-road vehicles, off-road vehicles such as propane-powered lawn-mowers and forklifts are also available.





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6. INFRASTRUCTURE

The infrastructure requirements of alternatives to gasoline and diesel vary. Biodiesel fuels and vehicles can be supported with little change to existing fueling and vehicle maintenance infrastructure. By contrast, hydrogen requires a unique system of production, distribution and dispensing that does not presently exist in the U.S. The infrastructure requirements of the six alternative fuels and their state of implementation in North Florida are detailed in this section. Generally, alternative fuel infrastructure in North Florida is underdeveloped and new facilities are required. Regulatory requirements surrounding construction of new infrastructure are also summarized in this section.

6.1. SCOPE

Biodiesel and ethanol blends can be dispensed at existing gasoline and diesel stations via well-established distribution methods. Relative to other alternative fuels, the scope of infrastructure required for these fuels is minimal. In some cases, separate tanks must be installed to handle these fuels alongside diesel and gasoline. Local production via secondary sources requires significant capital and operations investment. Typically several hundred thousand gallons of diesel demand is required to justify such investment

Electricity, hydrogen, natural gas and propane have distinct infrastructure needs described below. **Table 9** compares the relative cost of infrastructure for the various alternative fuels, a proxy for the scope of infrastructure required for each fuel.

TABLE 9: RELATIVE COST OF ALTERNATIVE FUEL INFRASTRUCTURE

Fuel / Technology	Cost
Biodiesel	Minimal*
Electricity	Low
Ethanol	Minimal
Hydrogen	Very High
CNG Time Fill	Moderate
CNG Fast Fill	High
LNG	High
Propane	Moderate

*High if fuel production from secondary sources is involved.

ELECTRICITY

Electricity is transmitted and distributed via the electric grid. EVs and PHEVs plug in to the grid to charge their batteries. The batteries power the vehicles. Owners of electric vehicles require the ability to charge vehicles at home or at the fleet yard. In addition, publicly accessible electric vehicle supply equipment (EVSE) is regarded as essential to support wide-spread adoption of electric vehicles. The EVSE scope (i.e. "level") required to meet private and public needs is determined by the rate at which vehicles can be charged.

- Level 1 EVSE provides charging through a standard U.S. 120 Volt (V) alternating current (AC) plug. Full charging time for an EV with a 60 mile range could take between 6 and 13 hours (e.g. over-night). Specialized EVSE is not required.

- Level 2 EVSE charges vehicles via a 208/240 V AC electrical service. Full charging time for an EV with a 60 mile range could take between 2 and 7 hours. EVSE with a dedicated circuit of 20 to 100 amps is required. Connectors and plugs for EVSEs and vehicles have been standardized to the Society of Automotive Engineers (SAE) J1772 standard, which specifies the equipment’s characteristics.
- A third level of charging (i.e. “DC fast charging”) station uses a 480 V direct current service to fully charge a vehicle with a 60 mile range in under 20 minutes. Highly specialized EVSE is required. Upgraded electrical service may be necessary. This kind of charging has yet to standardize connectors and plugs.



Electric vehicle charging stations are available from a variety of manufacturing sources. They feature various combinations of Level 1, Level 2 and DC fast charging EVSE, with Level 2 being the most common. Stations are often located where electric vehicle owners are concentrated, such as workplaces, shopping centers, airports and hotels. Public Level 2 charging stations cost between \$2,000 and \$13,000 to install, based on the experience of the Orlando Utilities Commission, which has installed dozens of public stations. Private stations can be substantially less expensive, since fully-featured models may not be necessary. The price for electricity at public stations range ranges widely – from \$0.00 to \$0.49 per kWh.

HYDROGEN

Infrastructure necessary to support hydrogen fueling is poorly defined at present, with only a handful demonstration stations nationally. Some stations receive liquid hydrogen via tanker truck. Others produce fuel onsite via natural gas reformation. Concepts are being developed to produce hydrogen on site via electrolysis. In several concepts a system of compressors is required to process fuel to an adequate energy density. On-site storage of fuel has been demonstrated in a liquid phase and a gas phase, both at grade and below ground. Specialized refrigerated or reinforced containers are required to store the fuel. Hydrogen can be dispensed at 5,000 psi, 10,000 psi or in a liquid phase. Home fueling stations are also in a research and development stage. Expected costs for hydrogen fueling infrastructure vary widely from \$500,000 to \$5 million.

NATURAL GAS

Infrastructure requirements for CNG and LNG differ significantly, although the fuels may be co-located (i.e. “L/CNG stations”).

CNG stations require access to natural gas supplied by a local distribution company (LDC) at adequate pressure. Typically, LDCs are willing to extend natural gas lines to a new station if none exist. Equipment must be installed to dry, filter and compress natural gas. CNG may be stored in high pressure



vessels. Flow and temperature regulators are often installed to control fuel dispensing, which may be dispensed via a bank of time-fill dispensers that typically fuel vehicles over several minutes to hours directly from the compressor. Fast-fill stations dispense fuel from compressors and high pressure (e.g. 4,300 psi) storage tanks in a time comparable to conventional fueling pumps. Time-fill stations are appropriate for hub-and-spoke fleets. Fast-fill stations are suitable for retail situations and the operational needs of some fleets. The cost of CNG fueling stations varies from \$200,000 to \$8 million depending on the number of vehicles and the speed at which each vehicle must be filled.

LNG stations receive fuel deliveries via tanker truck and store on site. A pump is used to move fuel from storage to the dispenser, where it is dispensed as a super-cooled liquid at 30 – 120 psi. Training and protective clothing is required to fuel a vehicle. CNG can be produced on site by expanding and compressing LNG. Station costs of stations may vary from \$1 to \$4 million.

PROPANE

Infrastructure required to fuel propane vehicles is relatively simple, including a storage tank, a pump and a dispenser. Fuel is delivered to the site via truck and stored onsite. A pump moves fuel from storage to dispenser under pressure, where the liquid fuel fills the vehicle tank. Experienced contractors are widespread and regulatory familiarity with the systems is high. Propane infrastructure ranges from \$30,000 to \$200,000 depending on fleet requirements. Local propane / Autogas marketers estimate that commercial fleet consumption of about 4,000 gallons per year, on average, is sufficient to establish a business case for installing infrastructure. For larger scale infrastructure, (e.g. infrastructure supporting a school bus fleet), conversing more vehicles may be required.

6.2. LOCATIONS

Locations to access alternative fuels remain relatively few in North Florida, with propane sources being the most widespread. In the near future, natural gas fueling stations are expected to grow significantly. **Figure 18** plots the location of existing stations.²⁴

Currently very few public fueling stations that offer B20 or E85 are in the North Florida study region. Low-level blends of ethanol and biodiesel (e.g. E10, B5) are sold widely, but may not be marketed as such. B20 is available at Pilot/Flying J stations in the region. Private stations are owned / operated by the City of Jacksonville (E85), St. Johns County (B20), Marine Corps Blount Island (B20) and NAS Jacksonville (E85).

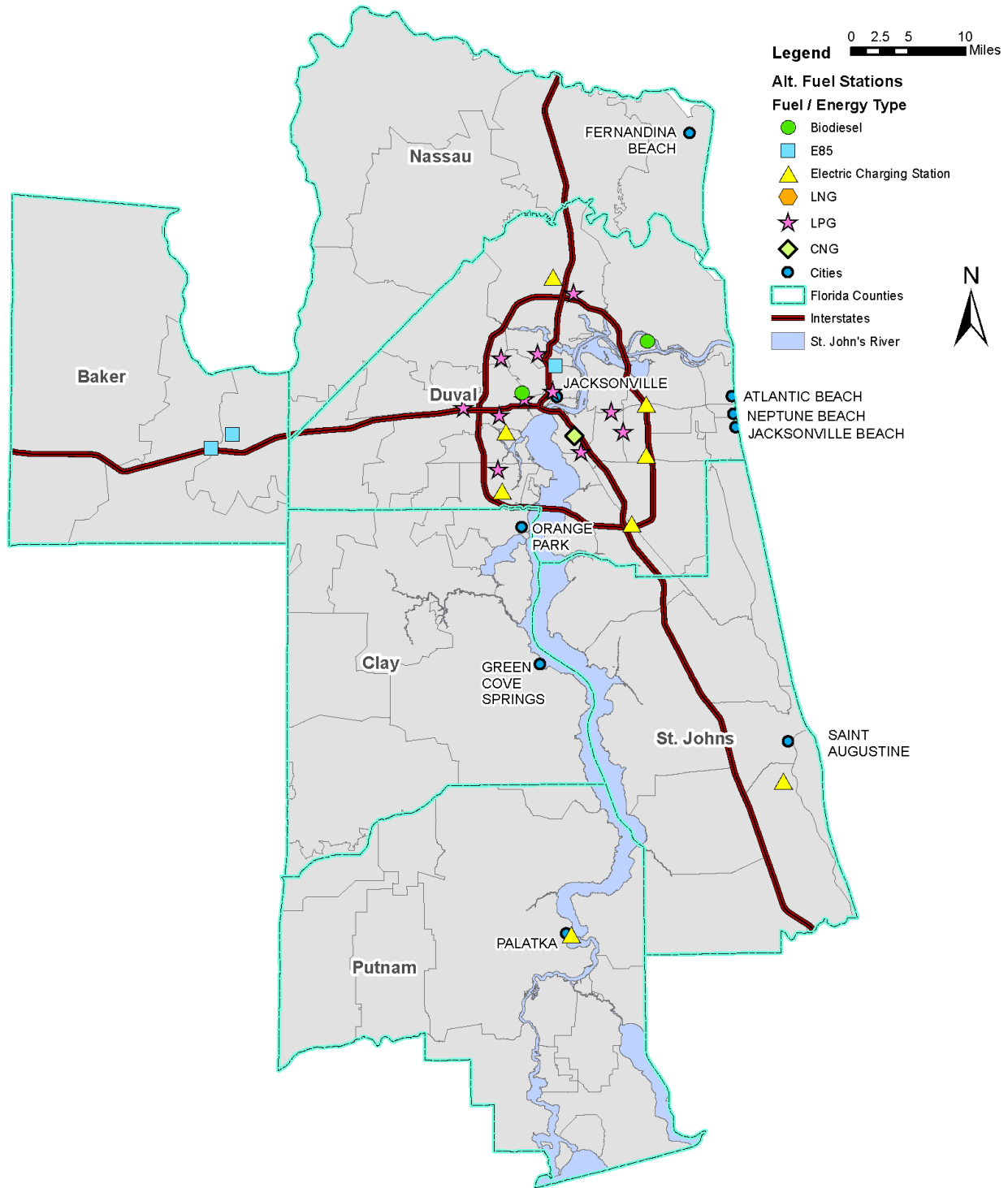
There is no hydrogen fueling infrastructure in either North Florida or the state.

More than a dozen electric vehicle charging stations are in North Florida. The majority are located at Nissan dealerships. Of these, most are private and associated with the dealerships' service centers. A public station is at King Airport Parking and the St. Johns Town Center. At the

²⁴ The data source for Figure 18 is the Department of Energy's Alternative Fuels Data Center (AFDC). The AFDC collects data on alternative fuel stations as part of projects undertaken by Clean Cities coalitions and other stakeholders. While the best single source of data on the subject, the AFDC database is not definitive and does not include all alternative fuel locations in the region. For example, it significantly under-represents the number of propane fueling stations located in the region, which may number as many as 50. As part of its on-going efforts to support alternative fuels in the region, the North Florida Clean Fuels Coalition intends to collect the most complete and up-to-date data available on alternative fueling infrastructure and communicate this information to the AFDC as well as its local stakeholders.

beginning of 2014, Tesla installed a Level 3 (“Supercharger”) in St. Augustine near State Road 16 and Premium Outlets Mall. Plans for two public Level 2 stations within the Water Street Garage in downtown Jacksonville are moving forward. Additional public stations are in early planning stages. See Section 10 for more information on local EVSE projects.

FIGURE 18: EXISTING ALTERNATIVE FUELING LOCATIONS (AFDC DATABASE)



No public CNG fueling stations currently exist in North Florida. A private station is maintained at TECO Peoples Gas' former customer service center in Jacksonville. Several CNG stations are in development, including private stations supporting Waste Pro's sanitation truck fleet, Jacksonville Transportation Authority's transit bus fleet, and St. Johns County's mid-duty vehicle fleet. The St. Johns County station will also have a public component. A similar arrangement is being explored for the Jacksonville Transportation Authority (JTA) project. Beverage distributor Champion Brands is planning to open a publicly-accessible CNG station at its Southside Jacksonville facility in late 2014. The City of Jacksonville is exploring a Renewable CNG production and fueling facility that would dry, filter and compress landfill gas for use in its vehicle fleet. A public fueling component is being explored.

Several LNG infrastructure announcements have been made in the North Florida area in recent months. A new LNG station opened at Lane Avenue and I-10 in Jacksonville in early 2014. Another is planned along I-95 in St. Johns County. A private fueling station has been built for the UPS fleet based off Imeson Road in Jacksonville. In 2013 Tote, Inc. / Sea Star Line and Crowley Maritime announced plans to operate four to ten LNG-fueled container ships out of Jacksonville's port. Tote, Inc. awarded a contract to a joint venture composed of AGL Resources and WesPac Midstream LLC to supply LNG to its ships. The partners have announced their intent to build a LNG plant in Jacksonville. Clean Energy Fuels Corporation has also announced plans to build an LNG fuel terminal to serve the transportation sector in the region. JEA announced an agreement with Sempra U.S. Gas and Power to explore developing natural gas infrastructure in the region.



Primary propane vehicle fueling infrastructure is available at a multitude of locations (approximately 40 – 50) around North Florida. Dozens of stations are associated with propane wholesalers and retailers, several of which maintain station databases on their websites, as well as U-Haul dealerships. Veolia operates a station on Jacksonville's Northside, which serves a large fleet of taxis. All stations are either private or priced to serve a broad market. Fuel prices at these latter stations are closer to retail bottle gas (e.g. propane used in barbeque grills) than fleet Autogas rates. There are no public stations offering Autogas pricing to the area's fleets.

6.3. PERMITTING

In Florida, regulation and permitting of alternative fuel infrastructure is not well defined. Local jurisdictions are the primary regulatory and permitting entities. However, given the limited amount of alternative fueling infrastructure in place, regulatory and permitting agencies may be inexperienced with alternative fuel infrastructure and unfamiliar with applicable specialized codes and standards. Project developers and regulators should consult with one another early and frequently during the planning, design and construction of alternative fuel infrastructure.

Verifying conformance with local zoning is typically the first step in developing alternative fuel infrastructure. Alternative fueling stations are generally "by right" uses in locations zoned industrial. Use "by exception" may be required in commercial or residential zones. Zoning is



generally administered by municipalities in the incorporated Cities and Towns in North Florida. Counties administer zoning in unincorporated areas. Concurrency review may also be required for new commercial developments.

Permitting alternative fuel stations, as with all construction projects, involves compliance with building codes. In North Florida, the building code permitting and inspection process is administered by Counties and incorporated Cities and Towns. Biodiesel, ethanol, hydrogen, natural gas and propane fueling stations all involve flammable liquids, cryogenics, or gas. Accordingly, the “High Hazard” provisions of the *Florida Building Code* apply to these facilities. For CNG and hydrogen, the *Florida Building Code Fuel Gas* also applies. The *Florida Fire Prevention Code* applies to most alternative fueling infrastructure. Accordingly, approvals and inspections by the local fire protection authority will be required for most projects.

The specialty codes detailed in **Table 10** apply to the local permitting and inspection process. They can be expected to be relied upon by local regulatory authorities. However, this list is not meant to be exhaustive. Greater education on and awareness of these standards among project developers, designers, contractors and regulatory agencies is necessary to support an expanded network of alternative fuel infrastructure in the region.

TABLE 10: SELECTED CODES & STANDARDS APPLICABLE TO ALTERNATIVE FUEL INFRASTRUCTURE

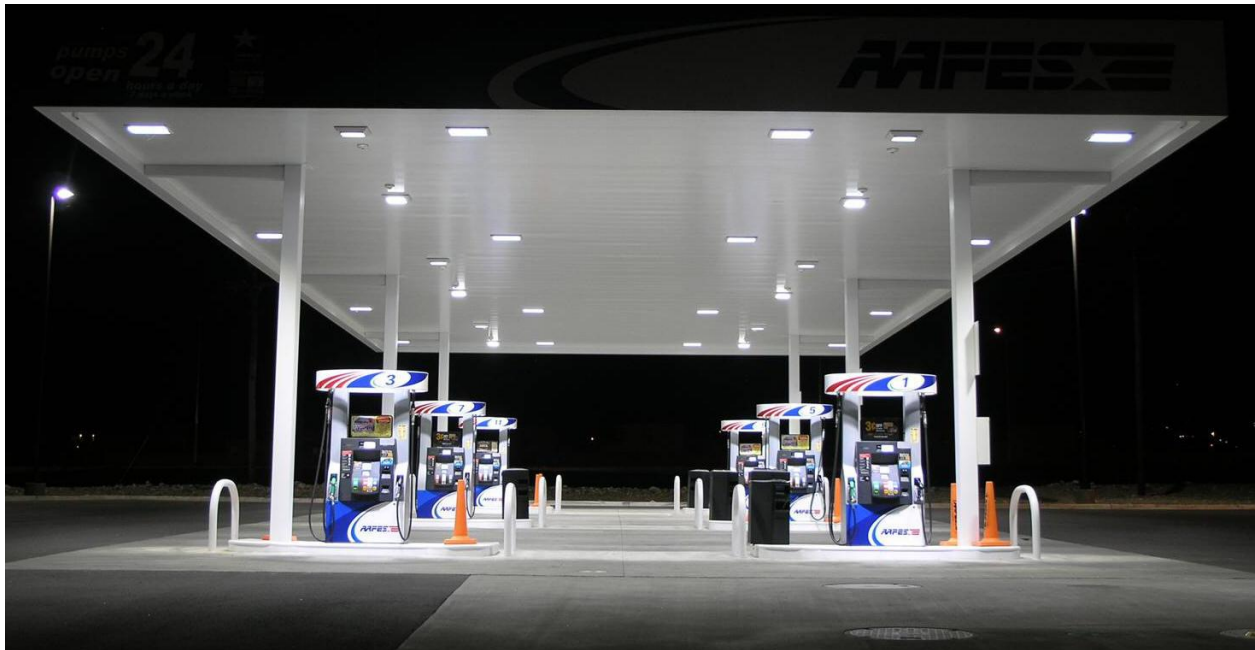
Code / Standard	B20	Electricity	E85	Hydrogen	CNG	LNG	Propane
American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code	●		●		●	●	●
National Fire Protection Association (NFPA) 2, Hydrogen Technologies Code				●			
NFPA 30, Flammable and Combustible Liquids Code	●		●				
NFPA 30A Code for Motor Fuel Dispensing Facilities and Repair Garages	●		●	●			
NFPA 52, Vehicular Gaseous Fuel Systems Code				●	●	●	
NFPA 58, Liquefied Petroleum Gas Code							●
NFPA 59A, Standard for the Production, Storage Handling of Liquefied Natural Gas						●	
NFPA 68 & 69, Standards on Explosion Prevention and Protection	●	●					
NFPA 70, National Electrical Code (NEC) Article 625: EV Charging System Equipment		●					

Other entities involved in regulating and approving alternative fuel infrastructure include local electric, water, sewer and stormwater utilities, which must verify availability of utility services and approve utility plans. Work that occurs within a local government or utility right of way or easement will likely require a permit from the applicable jurisdiction.

Environmental permits, including those associated with Federal regulations, such as the Clean Water Act, may also be required. Authority for administering these permits is often delegated to local or regional authorities. Fueling stations that involve above or below ground storage tanks, particularly those containing petroleum fuels (e.g. B20 and E85), must obtain permits for these tanks.

These permits may be administered by local authorities (e.g. City of Jacksonville) or by the Florida Department of Environmental Protection. An Environmental Resource Permit from the St. Johns River Water Management District (SJRWMD) is required for all new construction projects in the region. Many local jurisdictions also require a Wellhead Protection Permit (e.g. City of Jacksonville (COJ) Environmental Quality Division) for new construction projects in proximity to a regulated public water supply well.

Finally, most fueling stations must obtain one or more of several licenses (e.g. blender, retail dealer, etc.) administered by the Florida Department of Revenue. Local governments and mass transit agencies must apply for licenses to operate and obtain rebates for taxes paid on transportation fuel. A new category of licensee has recently been developed for retailers of CNG, LNG and propane.





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7. REGULATION

Rules, programs and incentives exist at the Federal, State and local level to promote alternative fuels, vehicles and infrastructure. This section details regulation at each level.

7.1. FEDERAL

The federal government has developed rules aimed at increasing use of alternative fuels in its own operations. It also administers a variety of programs designed to mobilize using alternative fuels in communities across the United States. A suite of intermittently available tax incentives help taxpayers.

RULES AND PROGRAMS

The federal government is a leader in utilizing its purchasing power to transform the market for clean fuels. It has set goals and procurement standards that guide federal agencies. It has attempted to set similar requirements for selected state agencies, though it has thus far declined to do so for local governments. A variety of federal programs provide support for local alternative fuel programs, most prominently those administered by the U.S. DOE, U.S. EPA and U.S. DOT.

As part of comprehensive greenhouse gas targets established by Executive Order 13514, federal fleets must reduce petroleum consumption by 2 percent a year through FY2020 relative to a FY2005 baseline. Seventy-five percent of new light-duty vehicles procured by non-exempt federal agencies must be AFVs. Alternative fuels are required to be used in dual-fuel vehicles, unless specifically exempted by the U.S. DOE, per the Energy Policy Act of 1992 (EPAAct 2009). Finally, The U.S. Department of Defense must preferentially procure EVs, PHEVs or hybrid electric vehicles. Tactical vehicles are excluded.



Federal agencies administer several programs that provide education, technical support and/or funding to various alternative fuel projects. These include the Clean Cities Program (U.S. DOE), State Energy Program (U.S. DOE), National Clean Diesel Campaign (U.S. EPA), SmartWay Transport Partnership (U.S. EPA), Clean School Bus USA (U.S. EPA), Clean Ports USA (U.S. EPA), Clean Construction USA (U.S. EPA), Clean Agriculture USA (U.S. EPA), Air Pollution Control Program (U.S. EPA), Congestion Mitigation and Air Quality (CMAQ) Improvement Program (U.S. DOT), and the Voluntary Airport Low Emission (VALE) Program.

FINANCIAL INCENTIVES

Several significant federal incentives have been available for alternative fuels in the past. Selected financial incentives provided by the Federal government are provided in **Table 11** below. Many have been subject to annual expiration and extension by the U.S. Congress, leading to uncertainty for project developers relying on them for successful implementation. Several widely utilized federal incentives expired December 31, 2013. As of mid-2014 these incentives have not been reauthorized.

In addition to direct federal incentives, the Renewable Fuel Standard sets a goal of national-wide use of 36 billion gallons of renewable fuel (i.e. biofuels) by 2022. Refiners, importers and blenders of gasoline and diesel are required to sell a certain volume of renewable fuel every year. Regulated entities may also comply by purchasing credits from third parties. The market price of credits has led to an incentive for producing and blending biofuels. However, the price of credits under the program has historically varied significantly, making investment in new biofuels production and blending projects uncertain.

TABLE 11: SELECT FEDERAL ALTERNATIVE FUEL INCENTIVES

Incentive	Description
Alternative Fuel Tax Exemption	Alternative Fuel (AF) used for farming; in intercity, local and school buses; by nonprofit organizations and by state and local governments are exempt from federal fuel taxes.
Alternative Fuel Infrastructure Tax Credit	Fueling equipment for B20, Electricity, E85, CNG, LNG, and propane was eligible for a tax credit of 30 percent of cost, excluding permitting and inspection fees, not to exceed \$30,000. Purchasers of qualified residential fueling equipment were eligible for a tax credit of up to \$1,000. This incentive expired on 12/31/13 and has not yet been reauthorized.
Alternative Fuel Excise Tax Credit	A tax incentive of \$0.50 per gallon sold / used was available for CNG, LNG and propane (or mixtures thereof). Tax exempt entities were eligible. Any credits in excess of excise tax liability were available as direct payment from the IRS. This incentive expired 12/31/13 and has not yet been reauthorized.
Second Generation Producer Tax Credit	A tax incentive of up to \$1.01 per gallon of second generation biofuel sold or blended was available to consumers, retailers or producers. This incentive expired 12/31/13 and has not yet been reauthorized.
Airport Zero Emission Vehicle and Infrastructure Incentives	Funding for 50 percent of the eligible cost of acquiring Zero Emission Vehicles (ZEVs) and/or supporting fueling infrastructure for public airports is available.
Biodiesel Income Tax Credit	An income tax credit of \$1 per gallon of B100 dispensed or utilized was available to retailers, or producers and consumers, respectively. This incentive expired 12/31/13 and has not yet been reauthorized.
Biodiesel Mixture Excise Tax Credit	A credit of \$1 per gallon blended with petroleum diesel against a biodiesel blender’s fuel tax liability, with any excess credit available as direct payment, was available to biodiesel blenders. This incentive expired 12/31/13 and has not yet been reauthorized.

TABLE 11: SELECT FEDERAL ALTERNATIVE FUEL INCENTIVES, CONTINUED

Incentive	Description
Qualified Plug-In Electric Drive Motor Vehicle Credit	A tax credit ranging from \$2,500 to \$7,500 is available for purchase of qualified PHEVs. The credit will be phased out for vehicles manufacturers that have sold 200,000 or more PHEVs.
Hydrogen Fuel Infrastructure Tax Credit	Hydrogen fueling equipment is eligible for tax credit up to 30 percent of the cost, not to exceed \$30,000. This credit expires 12/31/14.
Fuel Cell Motor Vehicle Tax Credit	Up to \$4,000 is available to purchase fuel cell vehicles. This credit expires 12/31/14.
Hydrogen Fuel Excise Tax Credits	Fuel tax credits of \$0.50 per gallon are available for liquefied hydrogen fuel or blended hydrogen fuel sold or used, with any excess credit available as direct payment from the IRS. This credit expires 12/31/14.

7.2. STATE

The State of Florida has developed rules aimed at increasing use of alternative fuels in its own operations. Grant programs and laws have been aimed at diversifying the state’s sources of transportation fuel. Recently, a new program of incentives was initiated for natural gas and propane fuels.

RULES AND PROGRAMS

The State of Florida operates under procurement standards that promote AFVs and alternative fuels. It has initiated grant programs to support developing alternative fuel production facilities and has established laws to aid the growth of electric vehicle supply equipment.

Select state fleets are required by Federal law (EPAAct 2009) to acquire AFVs. Florida fleets covered by this law include Florida Atlantic University, Florida International University, Florida Power and Light, the Florida Public Utilities Company, and the state Departments of Agriculture and Consumer Services, Children and Families, Environmental Protection, Health and Highway Safety and Motor Vehicles. Alternative compliance rules allow equivalent petroleum reduction activities in lieu of purchasing AFVs. Florida law requires all state agencies, universities, community colleges and local government fleets procuring vehicles under a state purchasing plan to select vehicles with the greatest fuel efficiency available in class. All state agencies must use ethanol and biodiesel blends when available.

In the past, the state provided matching grants for demonstration, commercialization, research, and development projects relating to renewable energy technologies, bioenergy, and innovative technologies that significantly increase energy efficiency for vehicles. EVSE made available to the public by a non-utility is not subject to Public Service Commission regulation. Further, it is unlawful to obstruct EVSE with vehicles not capable of using it. Insurance companies are prohibited from imposing surcharges on EVs unless actuarially justified. EVs registered in Florida are also exempt from tolls associated with high occupancy vehicle lanes.

FINANCIAL INCENTIVES

The state has provided several financial incentives, including rebates and tax advantages to promote alternative fuels, vehicles and/or infrastructure. **Table 12** summarizes these financial incentives.

TABLE 12: SELECT FLORIDA ALTERNATIVE FUELS INCENTIVES

Incentive	Description
Decal Fee for Florida Registered Vehicles	This fee has been eliminated for alternative fuel vehicles.
Biofuels Investment Tax Credit	This credit is available for 75 percent of all capital, operation, maintenance and research and development costs incurred with investment in the production, storage and distribution of biodiesel (blends of B10 or above), ethanol (blends of E10 or above), or other renewable fuel, up to \$1 million annually per income taxpayer. The annual budget for this program is \$10 million.
Biodiesel Tax Exemption	Biodiesel manufactured in a volume less than 1,000 gallons by a public or private secondary school for its own use is exempt from the diesel fuel excise tax.
Natural Gas and Propane Vehicle Rebates	As of January 1, 2014, a rebate of 50 percent of the incremental cost of an OEM natural gas or propane fleet vehicle up to \$25,000 and \$250,000 per applicant, per year, is available. For 2014, \$6 million has been allocated to the program, of which 40 percent is reserved for public fleets. The remainder is earmarked for private fleets. The Florida legislature must reauthorize funding annually.
Natural Gas and Propane Tax Holiday	CNG, LNG and propane will be subject to an excise tax at a rate of \$0.04 per GGE, a \$0.01 ninth-cent fuel tax, a \$0.01 local option fuel tax, and an additional variable component to be determined by the Florida Department of Revenue each calendar year for the following 12-month period. However, these fuels are exempt from sales and excise taxes until 2019.

7.3. LOCAL

While local governments and agencies have begun to use alternative fuels in their fleets, they generally have yet to initiate significant rules, programs or financial incentives. Exceptions are the North Florida TPO, whose North Florida Clean Fuels Coalition is the focus of substantial educational and financial support for alternative fuels and JEA.

RULES AND PROGRAMS

Local governments and agencies have generally not formally adopted rules or enacted laws specifically aimed at promoting alternative fuels. Several such entities are using alternative fuels in their fleets, as detailed in **Section 8**. The North Florida TPO, through its North Florida Clean Fuels Coalition, is providing significant educational and financial support to regional adoption of alternative fuels. Financial incentives from other local sources are not presently available.

The North Florida TPO has utilized funding from varied sources to provide significant incentives to local governments and authorities to adopt alternative fuel vehicles or infrastructure. The CMAQ Improvement Program provides federal funding to municipal planning organizations (MPOs) for projects and programs that reduce transportation-related emissions. Eligible activities include developing alternative fueling infrastructure and converting public fleet vehicles to operate on cleaner fuels. The Transportation Regional Incentive Program (TRIP) provides state matching funds to MPOs for improvements to regionally significant transportation facilities.

Using these sources, funds have been committed to St. Johns County and the City of Jacksonville to purchase CNG vehicles, to the Jacksonville Transportation Authority for a public CNG fueling station and FEC to purchase LNG locomotives. More detail on Projects is provided in **Section 10**. The North Florida TPO plans to continue to offer financial support for alternative fuel projects where prudent.

In 2014, JEA launched the Drive Clean program, which provides educational and financial resources for electric vehicles.

FINANCIAL INCENTIVES

The JEA Drive Clean program offers a \$500 and \$1000 rebates for EVs with batteries less than 15 kilowatts (kW) or 15 kW or higher, respectively

State law authorizes local governments to use income from a local infrastructure surtax to provide loans, grants or rebates to residential or commercial property owners to install electric vehicle supply equipment (EVSE) as well as propane, CNG and LNG infrastructure, if a local government ordinance authorizing this use is approved by referendum. Clay, Duval and Putnam Counties all presently levy a local discretionary sales surtax of 0.5 to 1.0 percent. However, none have dedicated funds for petroleum alternatives.

Florida also authorizes Property Assessed Clean Energy (PACE) financing programs. These programs explicitly facilitate local government finance of EVSE through a non-ad valorem assessment secured by a lien on the property. Other forms of alternative fuel infrastructure are very likely eligible projects as well. North Florida local governments can establish PACE programs. Alternatively, they may subscribe to the Florida PACE Funding Agency, which has raised \$500 million in private capital.





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8. GOALS

The goal of the federal Clean Cities program is to reduce petroleum consumption by 2.5 billion gallons annually by 2020. To reach it, the amount of petroleum displaced must increase by 17 percent per year.

As of 2014, North Florida displaces about 2 million gallons of petroleum fuel, with an annual growth rate of approximately 40 percent. Figure 19 charts the distribution of alternative fuel uses for both 2013 and 2014. Propane is the region’s dominant alternative fuel. However, the graph also illustrates significant growth in the use of natural gas fuel in the region.

Past, current and publicly announced projects suggest that North Florida has the potential to meet or exceed the annual displacement rate goal established by the federal Clean Cities program.

Further, trends established by past and expected projects suggest the North Florida Clean Fuels Coalition can establish goals that reflect North Florida’s own ambitions to expand fuel diversity and realize the benefits of petroleum alternatives.

Several alternative fuel projects have recently been implemented or publicly announced in the region. **Table 13** summarizes many of these, but does not attempt to summarize all activity in this rapidly developing market. The table includes estimates of the number of Alternative Fuel Vehicles currently and projected to be involved in known projects.

In addition to the projects listed in **Table 13** are several large alternative fuel projects in the rail and maritime sector. These projects, currently in various development stages, have the potential to dramatically increase consumption of alternative fuels in North Florida. **Table 13** does include one of these projects: converting four FEC locomotives to LNG. This project is funded in part by the North Florida TPO. Rail and maritime alternative fuel projects not included in **Table 13** are listed below the table.

Moving forward, the North Florida Clean Fuels Coalition will endeavor to keep this master updated by gathering, tracking, analyzing and reporting data on existing and new petroleum-alternative projects as it becomes available.

FIGURE 19: BASELINE ALTERNATIVE FUEL CONSUMPTION IN NORTH FLORIDA

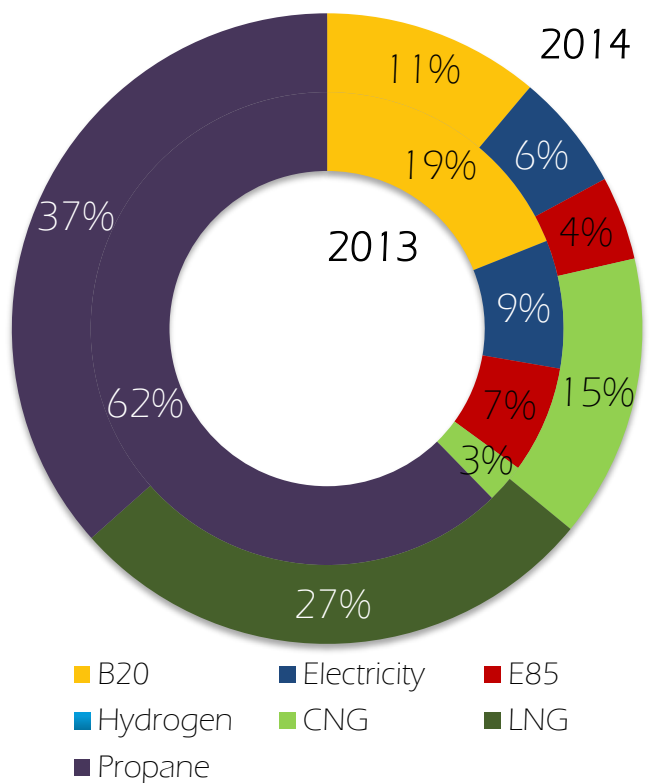


TABLE 13: ON-GOING AND PLANNED ALTERNATIVE FUEL PROJECTS, 2014

Project	Owner	Fuel	2013	2018*
Fleet Vehicles	COJ (for use in JEA fleets, etc.)	B20	133	133
Fleet Vehicles	JEA	B20	546	546
Biofuel Production & Fleet Vehicles	St. Johns County	B20	266	266
Fleet Vehicles	First Coast Biofuels	B20	1	1
Fleet Vehicles	Orange Park Shepherd Center	B20	1	1
Public / Private Dispenser & Fleet Vehicles	Champion Brands	CNG	0	40
Public / Private Dispenser & Fleet Vehicles	JTA	CNG	0	60
Public / Private Dispenser & Fleet Vehicles	St. Johns County	CNG	0	130
Private Dispenser & Fleet Vehicles	WastePro	CNG	0	50
Fleet Vehicles	Mike Davidson Ford	CNG	6	6
Private Dispenser & Fleet Vehicles	C&C Fisheries	CNG	0	4
Private Landfill-Gas-to-CNG & Fleet Vehicles	COJ	CNG	0	7
Fleet Vehicles	NAS Jax	E85	112	112
Dispenser & Fleet Vehicles	COJ (for used in JSO fleets, etc.)	E85	37	37
Fleet Vehicles	American Homegrown Fuel Corporation	E85	1	1
Fleet Vehicles	NAS Jax	Electricity	80	80
Private Vehicles	Various	Electricity	218	500
Public EVSE Network	JEA (and others)	Electricity	-	-
Locomotives	FEC	LNG	0	4
Public Fuel Dispenser	Clean Energy	LNG	-	-
Private Dispenser & Fleet Vehicles	UPS	LNG	0	128
Fleet Vehicles	Raven Transport, Inc.	LNG	0	36
Fleet Vehicles	Veolia Transportation	Propane	100	100
Fleet Vehicles	Ferrellgas	Propane	5	5
Fleet Vehicles	Progasco Corp / D&D Gas	Propane	6	6
Fleet Vehicles	Gator City / Go Shuttle	Propane	115	115
Fleet Vehicles	Putnam County School District	Propane	3	3
Private Dispenser & Fleet Vehicles	WW Gay	Propane	15	15

The following rail / maritime alternative fuel projects have been announced, but are not included in the above table. As project details emerge, the North Florida Clean Fuels Coalition will attempt to document expected effects on the region's use of alternative fuels.

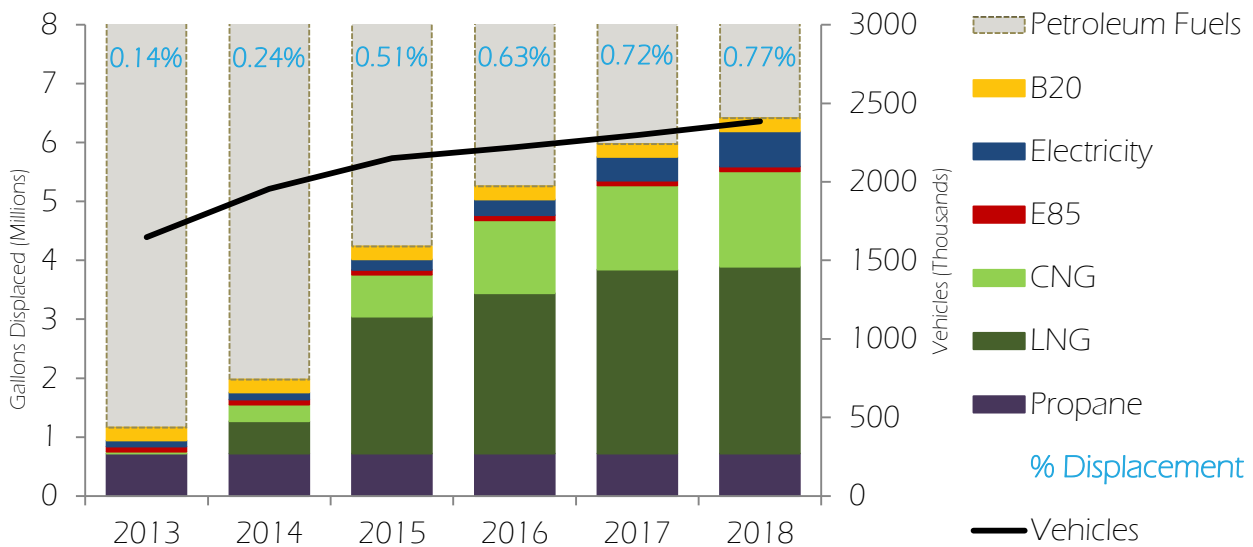
- Sea Star Line LLC and Crowley Maritime Corporation have announced orders for four to ten LNG-powered ships. Based on the size of ships announced, the associated LNG tanks could each hold about 200,000 gallons.

- CSX Corporation has announced plans to retrofit locomotives to run on LNG and is exploring other options to utilize natural gas in its rail yard operations.
- A joint venture between AGL Resources and WesPac Midstream, LLC has contracted with Tote, Inc. to supply LNG to its ships. The joint venture has also announced its intent to build a LNG liquefaction / storage facility in Jacksonville.
- Clean Energy Fuels announced plans to construct a LNG liquefaction plant in proximity to Jacksonville’s port, producing up to 300,000 gallons of LNG per day. The plant is intended to provide fuel for trucks, trains and ships.
- JEA and Sempra U.S. Gas and Power have announced a partnership to explore natural gas fuels projects in North Florida.

Figure 19 charts an estimate of petroleum fuel displacement by fuel type and the number of alternative fuel vehicles based on the projects detailed in Table 13. It does not include the rail maritime projects listed above, but does include the FEC project included in Table 13.

Total petroleum fuel use from 2013 through 2018 is expected to remain at about 830 million gallons per year. Alternative fuel use in the region, meanwhile, may displace an estimated two million gallons through 2014, potentially growing to nearly 6.5 million by 2018. The average rate of growth in petroleum displacement over the period is estimated at 22 percent per year. This projection is based on existing and announced projects. As a result, it represents a baseline expectation. As noted, significant rail and maritime projects are not included. In addition, the results of concerted efforts by the North Florida Clean Fuels Coalition and other stakeholders may be expected to push the region’s performance further. The North Florida Clean Fuels Coalition’s strategies to accelerate adoption of petroleum-alternatives are the subject of the next section.

FIGURE 20: PROJECTED PETROLEUM DISPLACEMENT (GALLONS) BY FUEL AND ALTERNATIVE FUEL VEHICLES, 2013 – 2018*



*Exclusive of noted rail and maritime alternative fuel Projects



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9. STRATEGIES

Alternative fuels, vehicles and infrastructure can benefit North Florida with fuel savings, improved public health and reduced reliance on foreign suppliers. However, significant barriers exist. The North Florida TPO has organized the North Florida Clean Fuels Coalition to help address barriers and realize benefits. In this section, strategies for overcoming barriers are described for biodiesel, electricity, ethanol, hydrogen, natural gas and propane.

9.1. BIODIESEL

Biodiesel blends (e.g. B20) may be used in existing diesel vehicles with little or no modification. The impact on maintenance and operations is similarly minimal. The fuel can be sourced locally at prices equal to or less than diesel fuel. It may also be produced in small quantities from widely available secondary sources at a total cost well-below prices for petroleum diesel. Utilizing these secondary sources has the co-benefit of reducing expenses and environmental impacts associated with sanitary sewers. Air quality impacts and greenhouse gas emissions are reduced as well.



Despite the advantages of biodiesel, several barriers stand in the way of widespread deployment in North Florida. Availability of biodiesel in a retail setting is prevented by lack of reliable supply, regulatory uncertainty and infrastructure requirements.

Commercial-scale production of biodiesel from primary sources ranges from 10 to 100 million gallons a year. Using today's technology, the feedstocks (e.g. soybeans) for such production levels are primarily located in the Midwest. In the absence of consistent government support, the distance of feedstocks from demand has prevented biodiesel production business models from developing in the region. Further, retail of blended biodiesel (or ethanol) at gas stations requires at least two fuel tanks. .

Local government is well positioned for pursuing small-scale production of biodiesel from secondary sources, as exemplified by St. Johns County. However, the capital and operational investments required necessitates a diesel fuel demand of about 300,000 gallons per year (or 60,000 gpy of B20). In North Florida, only a few local governments meet this criterion, including potentially JTA, JEA, the City of Jacksonville, Duval County Public Schools (DCPS) and Clay County. While large local governments can be a primary source of biodiesel, they are limited in their ability to provide fuel to other entities on a retail basis. Further, to the extent that large government fleets utilize their diesel demand to amortize investments in other alternative fuels, such as compressed natural gas, opportunities to utilize biodiesel may be foregone.

The following strategies have been developed with these barriers in mind.



B1. EDUCATION, OUTREACH AND AWARENESS

Provide “top-down” and “bottom-up” education to organizations managing large diesel fleets on the benefits of biodiesel blends.

Biodiesel is not widely used in the region, despite its many benefits. Continue to provide actionable information to leaders in the public and private sectors (e.g. division directors, elected officials, executive officers, etc.), fleet operators and the public on these benefits.

Given the significant potential for local production of biodiesel by local government entities via collection and processing of secondary sources, tailor educational efforts to leaders and fleet managers associated with these entities. For example, the City of Jacksonville operated a biodiesel production facility in the recent past. However, it is no longer operational. The City of Jacksonville could repower its production facility, potentially via a public-private partnership model. Under this model, significant volumes of biodiesel could be produced at no upfront capital cost to the City. Capital costs would be amortized via fuel charges. Under this model, fuel could potentially be provided on a retail basis to other entities.

Working with FDOT and local governments, a system of roadway signage could be developed to inform motorists of biodiesel and other alternative fuels available at specific locations throughout the region. Signage could be part of a campaign to brand major roadways in the region as a “North Florida Alternative Fuels Corridor.”

B2. PRODUCTION EQUIPMENT SUPPORT

Provide support to local governments and authorities for investment in biodiesel production equipment.

Given potential fuel savings and benefits to water quality, public investment in small-scale biodiesel production facilities may have a favorable return on investment. However, capital investment in fuel production equipment is significant and must compete with investments in other alternative fuels, such as natural gas. Working with public fleets, determine what forms of incentive or recognition is necessary to make production of biodiesel viable.

St. Johns County produced 250 gallons of biodiesel per day for its heavy-duty diesel vehicle fleet. It produced the fuel from waste oils and fats collected from grease traps at kitchens and restaurants. Collecting of these secondary sources helped reduce sanitary sewer maintenance and improve water quality in the County. Further, St. Johns County produced biodiesel at a substantial savings relative to the price it would otherwise have paid for petroleum diesel. Studies conducted by the County reflected no additional maintenance costs or operational changes as a result of using biodiesel in its fleet.

The County’s program was discontinued following a decision to enter into a public-private partnership to fuel its vehicles with natural gas. Nevertheless, the County’s program serves as a potentially replicable model for other local governments and authorities in the region. Duval County Public Schools, given the size of its vehicle fleet and its direct access to secondary sources of biodiesel via cafeteria kitchens, may be a potential a candidate.

B3. INCENTIVES FOR BIODIESEL

Provide incentives and/or recognition to entities that support wider availability of biodiesel in the region.

Financial incentives and/or recognition may support wider availability of both commercially-produced biofuel from primary sources as well as locally-produced fuel from secondary sources.

While ASTM standards permit sale of diesel fuel blended with up to 5 percent biodiesel by volume, higher blends, particularly those regarded as alternative fuels by EPA Act 1992 (e.g. B20 or above), are not widely available at public fueling stations within North Florida. In the past, federal tax credits to sell biodiesel or blends thereof encouraged local distributors and/or retailers to offer biodiesel at the pump. However, these incentives have been intermittent and are currently not available. Working with distributors and/or retailers, determine what forms of financial incentives or recognition are necessary and feasible to make biodiesel blends widely available at the pump.

Biodiesel produced from secondary sources depend on available sources. Local governments could provide financial incentives (e.g. tax abatement) for suppliers of secondary sources that support local biofuels producers. This would increase the region's biodiesel production potential of the region.

B4. MANDATES FOR USE IN PUBLIC FLEETS, PUBLIC CONTRACTORS' FLEETS

Work with local governments and authorities to require fleets to utilize biodiesel blends in all or a portion of their diesel fleet. Work with local governments and authorities to require contractors to utilize biodiesel blends in all or a portion of their diesel fleet.

Federal fleets must reduce petroleum consumption by 2 percent a year through FY2020 relative to a FY2005 baseline. Seventy-five percent of new light-duty vehicles procured by non-exempt federal agencies must be AFVs. Alternative fuels are required in dual-fuel vehicles. EPA Act 2009 requires acquisition of AFVs or equivalent petroleum reduction activities for certain state agencies and utilities under the Alternative Fuel Transportation Program (AFTP), including two utilities providing services in the region: FP&L and Florida Public Utilities Company.



A significant number of large public fleets are in the region. These fleets can have a significant impact on local petroleum consumption, while providing leadership by example to private fleets. The same is true of public contractors. For instance, the City of Jacksonville Councilman John Crescimbeni introduced legislation requiring WastePro to construct a CNG fueling facility and procure CNG sanitation trucks as a condition of contract extension. The company subsequently announced plans to construct a private, time-fill CNG fueling station and convert its fleet to CNG trucks.

Working with local governments and authorities with large vehicle fleets (e.g. over 50 vehicles) and elected representatives thereof, develop either voluntary or statutory standards for B20 use in public fleets and/or contractors' fleets.

9.2. ELECTRICITY

Globally the number of electric vehicles on the road doubled during 2013. Locally, the growth of EVs registrations has grown by more than 60 percent over the past five quarters for which data was available (January 2013 – March 2014). Government forecasts project accelerating growth nationally. Meanwhile, the technologic innovations supporting electric vehicles, including energy-dense batteries and lightweight materials, are expected to continue.

Electric vehicles are inexpensive to operate relative to conventional options. In recent model years, an increasingly wide variety of OEM electric vehicle options are available, particularly in the passenger vehicle market. Increasing variety has been accompanied by significant reductions in EV sticker prices.



The efficiency of electric powertrains relative to internal combustion engines delivers environmental advantages. This advantage grows as the electric grid shifts to cleaner fuels, as is expected. As a result, EVs can play a role in significantly reducing air pollution and greenhouse gas emissions.

While the role of EVs is expected to expand in North Florida, barriers remain. Despite recent price decreases, EVs are more expensive than comparable conventional vehicles. Federal incentives for EVs and supporting infrastructure exist to reduce the first-cost of owning an electric vehicle. However, as with other alternative fuel incentives, eligibility terms are complex and availability is intermittent. Presently, state or local incentives are not available.

Further, demand for EVs is limited by perceptions that the vehicles are not suitable for the average driver’s all-purpose mobility needs. Supporting such anxieties is a lack of accessible electric vehicle charging equipment (EVSE) in the region. Presently, only a few publicly-accessible stations exist in Northeast Florida. Outside the region, availability of EVSE varies significantly. As a result, EVs may not be a suitable choice for long-distance travel or certain light-duty commercial applications. EVSE may be required to support wider use of electric vehicles and extend the range of EVs and PHEVs in our region.

The following strategies are recommended to increase electricity as a transportation fuel in North Florida.

E1. DEVELOP PLAN FOR REGIONAL NETWORK OF CHARGING STATIONS.

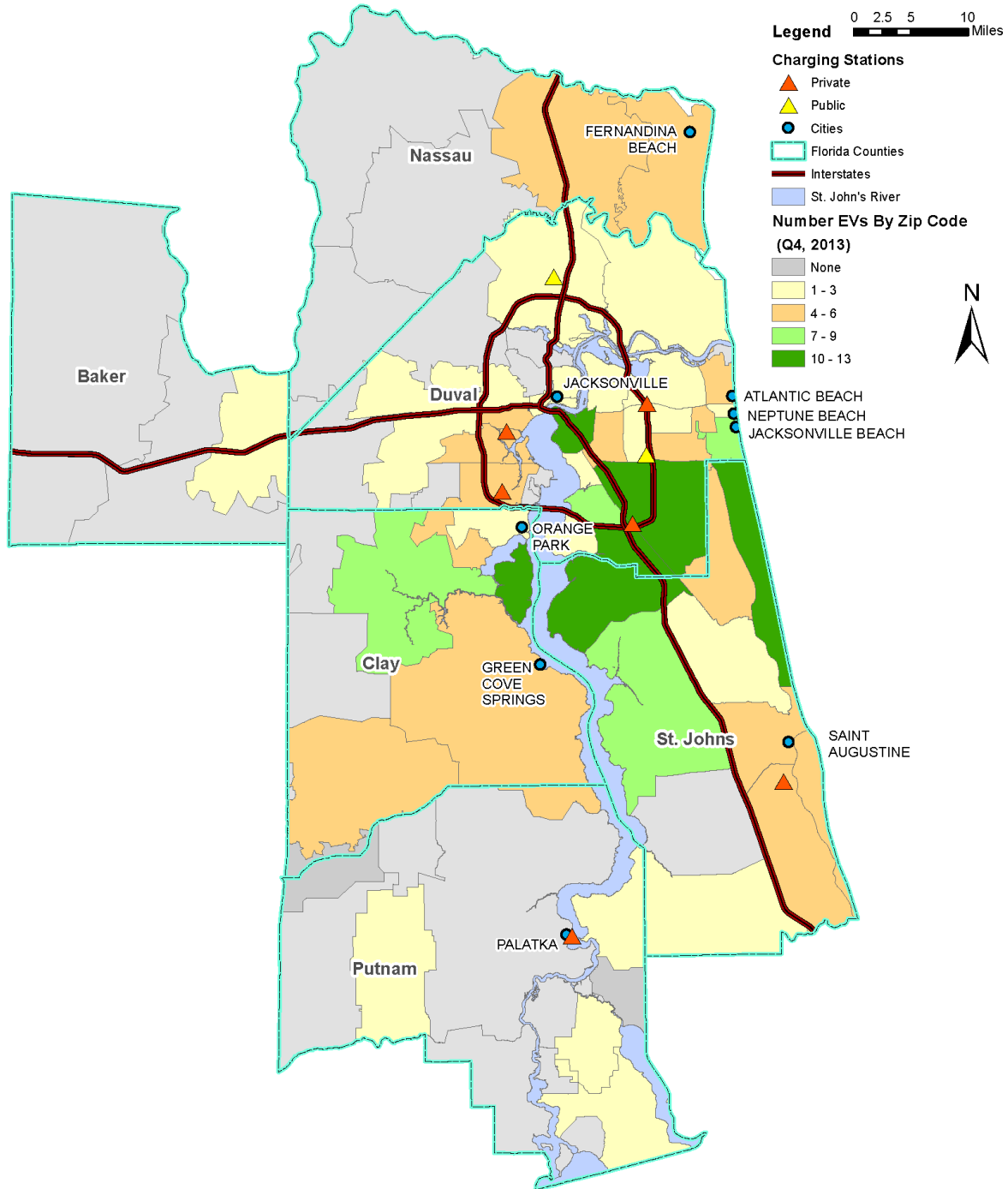
Develop a plan that determines the most favorable areas for EVSE and an implementation strategy.

A regional network of public charging stations located at workplaces, major destinations and along major transportation corridors, would facilitate electric-powered travel region-wide among early adopters of EV technology. In addition, it would reduce range anxiety, which is critical for making EVs a mainstream choice.

Identifying solutions for siting EVSE, selecting appropriate EVSE, usage policies and fees, risks and liability issues, zoning and land use regulations, and permitting can support greater regional

deployment of EV charging infrastructure. Significant local planning is required to accomplish these tasks. Figure 20, which plots the location of current EV registration in the region by zip code, as well as the location of currently operating public and private EVSE, is an example of the kind of data and analysis that might support such planning.

FIGURE 21: EV REGISTRATIONS BY ZIP CODE THROUGH DECEMBER 2013 & EVSE LOCATIONS²⁵



²⁵ Source of EV locations is the U.S. Department of Energy's Alternative Fuels Data Center

Supplemented by other key data (e.g. demographic, real estate, employment and transportation), a data-based planning tool could be developed to provide insight into the region's EVSE requirements.

The Southeast Florida Clean Cities Coalition has developed an *EV Community Readiness Plan* which generally identifies several critical factors contributing to wider use of electric vehicles in Florida, including planning for local EVSE infrastructure. This plan could serve as a basis for local planning in North Florida.



Drive Electric Orlando has implemented a program that organizes rental car agencies, hotels, restaurants and attractions to provide a branded electric vehicle experience for tourists, business travelers and residents of the Central Florida area. The rental car agencies make EVs available, while EVSE is sited at high-use locations. The program leverages Orlando's national leadership in EVSE. The City now boasts more than 200 charging events per month. Orlando's experience provides a potential implementation model for North Florida.

Collecting and appropriately analyzing available data, identifying best practices from statewide leaders, establishing a network of regional stakeholders and partners and identifying policy and project priorities and can help ensure that investments in EVSE efficiently and effectively support rapid growth in EV use in North Florida.

E2. INCENTIVES FOR EV STATIONS

Provide incentives for installation of EVSE.

Only four fully public EV charging stations are in North Florida, while North Florida Counties have the fewest EVs per 10,000 residents among the state's major regions. While some public EV charging stations are expected to come on-line in the near future. The Orlando and Tampa regions each have well over 100 public stations and lead the state in EVs per 10,000 residents. South Florida leads the state in the total number of EVs. Greater availability of public EVSE is required to boost the number of EVs and PHEVs in North Florida.

The Orlando Utilities Commission (OUC) offers a rebate of up to \$1,000 to purchase and install commercial EVSE. It also holds site licenses with host customers (e.g. workplaces, retailers, etc.) for OUC-operated EVSE. The City of Jacksonville's Environmental Protection Board offers a rebate of \$1,000 for facilities that receive certification under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program. The LEED program encourages installation of EVSE at facilities. CSX is utilizing federal grant funding from the City of Jacksonville to install EVSE in a city-owned public parking garage in the downtown area.

Identifying funding sources and working with local governments and authorities, utilities as well as major employers and venues, to develop or support effective incentive programs will reduce the cost of installing EVSE, while extending its benefits to employees, tenants, visitors, patrons, etc. of local buildings.

E3. INCENTIVES FOR EVS & PHEVS

Provide incentives to reduce the incremental cost of procuring EVs and/or PHEVs.

EVs and PHEVs provide significant life-cycle cost savings compared to conventional gasoline vehicles, due to their high energy efficiency and the relatively low cost of electricity. However, the purchase price of these vehicles remains several thousand dollars higher than conventional automobiles.

Approximately two-fifths of States provide tax credits, reduced licensing fees or rebates to purchase EVs and/or PHEVs. As noted in Section 7, the State of Florida initiated a \$6 million program in 2014 to provide funding to offset the incremental cost of natural gas or propane vehicles. The Drive Electric Florida coalition was established in 2013 to advocate for similar, EV-friendly programs at the state level.

The City of Jacksonville utilized federal grants to cover the incremental cost of high-efficiency vehicles and procured two Chevrolet Volts under this program. Similar incentives could help drive adopting EVs in municipal fleets.

In order to influence the consumer market, incentives could be provided through automobile dealers. Connecticut and Massachusetts have recently unveiled incentive programs that operate at the point-of-sale or reward dealers who excel at selling EVs. Incentives are accompanied by education and outreach to encourage dealers to provide accurate and reliable information to car-buyers regarding their options. Utilities, such as JEA have a long track record of operating similar programs aimed at encouraging purchase of energy-efficient durable goods, such as solar water heaters.

Identifying funding sources and working with the state, utilities, car dealers and large local fleets can define opportunities to cost effectively increase the number of EVs in the region, while reducing the lifecycle operational costs of government fleet vehicles.

E4. SUPPORT DEVELOPMENT OF UTILITY POLICES AND PROGRAMS TO ELECTRIFY TRANSPORTATION

Work with power providers to develop and/or support policies and programs that are mutually beneficial to utilities and electrified-transportation technology owners.

EV and PHEV owners primarily charge their vehicles at home. The optimal time to do this is overnight, when power providers have substantial excess capacity and their marginal cost of electricity is low. EVSE located at multi-family dwellings, workplaces and other high-density locations provide a new source of sales for utilities and support a highly energy-efficient transportation option for the community. Electrifying forklifts, idling trucks (i.e. “truck stop electrification”), airport vehicles (i.e. gated airplanes, airside support vehicles, etc.), rail and port vehicles (i.e. “cold-ironing” of ships, electric cranes, etc.) also have the potential to increase sales, boost efficiency and reduce emissions. Over the long-term, in conjunction with “smart-grid” development, EVs may be a source for power during times of high demand. Specific utility incentives or policies can help spur investment in electric vehicles and infrastructure and guide how it is used to benefit North Florida’s economy and environment.

Financial incentives for the incremental cost of electric equipment, utility-provided public EVSE, time of use (TOU) rates that make electricity cheaper overnight, separate metering and rates for EVSE are some examples of utility policies or programs that could support electrifying transportation. JEA is currently developing an electrifications strategy covering both EVs / PHEVs as other transportation infrastructure. Working with local power providers, such as JEA, electric service policies and programs may be developed that align incentives to increase adopting electric vehicles and electrifying transportation infrastructure.

E5. EDUCATION, OUTREACH AND AWARENESS

Provide actionable information to the public, residential developers, employers, property managers, auto-dealers and other key stakeholders on EVs and EVSE.

Working with FDOT and local governments, a system of roadway signage could be developed to inform motorists of EVSE and other alternative fuels at specific North Florida locations. Signage could be part of a campaign to brand major roadways in the region as a “North Florida Alternative Fuels Corridor.” The California Plug-In Electric Vehicle Collaborative has developed an [*Accessibility and Signage for Plug-In Electric Vehicle Charging Infrastructure*](#) manual that recommends signage standards for electric vehicles. These recommendations could be the basis for efforts in North Florida. For EVSE in particular, consistent signage and branding may be important to raise awareness of electric vehicle infrastructure, educate the public on the benefits of electric vehicles and attract stakeholders to participate in regional EVSE infrastructure.

Multifamily dwellings are a significant source of new residential development in North Florida. However, residents are not typically able to install charging infrastructure. EVSE at workplaces can complement home charging and serve as an employee benefit, aiding retention and boosting productivity. Deploying EVSE at multifamily dwellings and workplaces can be an important amenity for both owners/renters as well as employees. Helping residential developers, employers and property managers understand and participate in the benefits of installing EVSE, while providing solutions to problems concerning ownership, liability, operations and maintenance, can help foster better regional EVSE infrastructure and help increase EV purchases.

E6. DEVELOP REGULATORY POLICIES AND PROCEDURES TO FACILITATE EVSE DEVELOPMENT

Facilitate collaboration between developers, owners and regulatory officials to establish reasonable and predictable processes for EV and EVSE use and development.

Regulatory policies and procedures that promote rather than impede EV ownership and EVSE deployment are needed to expand adoption. Comprehensive planning, zoning and land development regulation may presently contain barriers to establishing EVSE. Meanwhile, the regulatory process may hold opportunities for incentivizing electric vehicles and infrastructure. Enhanced comprehensive planning, zoning and land development regulation present opportunities for greatly expanding access to EVs and EVSE. The same is true for streamlined and expedited permitting, including pre-approval processes for this relatively simple equipment that can speed its adoption.

Several municipalities have made parking free for EV owners, particularly in high-demand areas. Others have required EVSE or EVSE-ready infrastructure as part of development conditions. The Southeast Florida Clean Cities Coalition has reviewed national best practices and developed a series of recommendations for enhancing regulation of EVs and EVSE. These recommendations are included in its [Getting Southeast Florida Plug-In Ready](#) report. Using these recommendations as a starting point and establishing a forum for communication between the parties involved in EVs and EVSE can help create a supportive regulatory environment in North Florida.

9.3. ETHANOL

Ethanol blends (e.g. E85) may be used in flex fuel vehicles. These vehicles are widely available at little or no incremental cost. However, flex fuel vehicles travel fewer miles per gallon when using ethanol. While predominately sourced renewably from corn in the U.S., new technologies are opening up cellulosic feedstocks to producers in Florida. Such sources have the potential to provide improved access to the fuel, along with substantially reduced greenhouse gas emissions.



Despite advantages, widespread use of ethanol faces several barriers. As with biodiesel, historic demand for the fuel in the region has been low, making the investment required to provide the fuel in a retail setting unattractive (e.g. installing multiple fuel tanks).

Beyond the barriers shared in common with biodiesel, ethanol also suffers from perception problems. Ethanol is a hygroscopic fuel, meaning that it attracts and holds water molecules from the surrounding environment. This is a concern for boaters, whose outboard engines can accumulate water in the fuel system and misfire. While this issue does not typically affect automobiles, it has affected the fuel’s public perception. Ethanol’s hygroscopic properties also increase the cost of storing the fuel in tanks at fueling stations. For these reasons and others, a market has developed in the region for premium-priced “ethanol-free” fuel.

The following strategies are recommended to increase ethanol utilization in North Florida.

A1. MANDATES FOR USE IN PUBLIC FLEETS, PUBLIC CONTRACTORS’ FLEETS

Work with local governments and authorities to require fleets to utilize ethanol blends of E85 or higher in all or a portion of their flex fuel fleet; work with local governments and authorities to require contractors to utilize biodiesel blends in all or a portion of their flex fuel fleet.

Federal fleets are required to reduce petroleum consumption, purchase AFVs and utilize alternative fuel in Flex Fuel vehicles. FP&L and Florida Public Utilities Company are required to purchase AFVs or enact equivalent petroleum reduction activities.

A significant number of large public fleets are in the region. Many have procured a large number of flex fuel vehicles. However, historic demand for E85 in the region has been low. These fleets can have a significant impact on local petroleum consumption, while providing leadership by example to private fleets. The same is true of public contractors.

Working with local governments and authorities with large vehicle fleets (e.g. over 50 vehicles) and elected representatives, develop either voluntary or statutory standards to procure flex fuel vehicles and use E85 in flex fuel vehicles in public fleets and/or the fleets of contractors.

A2. INCENTIVES FOR INCREASING AVAILABILITY AT FUELING STATIONS

Provide incentives and/or recognition to distributors and/or retailers who provide E85 or higher blends at public fueling stations in North Florida

While ASTM standards permit sale of gasoline blended with up to 10 percent ethanol by volume, higher blends, particularly those regarded as alternative fuels by EPA Act 1992 (e.g. E85 or above), are not currently available at any public fueling stations within North Florida. Flex fuel vehicles are widely available and are by far the most numerous AFVs in the U.S.

In the past, federal tax credits for blending ethanol with gasoline (or biodiesel with diesel fuel) encouraged local distributors and/or retailers to offer biodiesel at the pump. However, these incentives have been intermittent and are currently not available. In addition, retailing ethanol may require additional capital and operating expenditure to provide fuel storage and management.

Working with distributors and/or retailers, determine what forms of financial incentives or recognition is feasible to make ethanol blends more available at the pump.

9.4. HYDROGEN

Hydrogen vehicles are fuel efficient and largely free of emissions, depending on the fuel source. Further, hydrogen production and infrastructure can be complimentary to natural gas infrastructure. However, near-term deployment is limited by the current lack of fuel sources, vehicles and infrastructure. Important aspects of hydrogen fueling technology remain to be defined. The following strategy is recommended to ensure that the region remains capable of seizing opportunities to utilize hydrogen fuel as they arise.



H1. DEMONSTRATION PROJECTS

Position North Florida to take advantage of programs and grants for hydrogen research and demonstration projects.

Commercial methods for producing and distributing hydrogen, developing vehicles to utilize it, and synergies with other fuels, such as natural gas, are an active subject of industry and federal research and development. R&D resources will flow to states and communities that have demonstrated a commitment to alternative fuel innovation.

California has long supported hydrogen fuels. As a result, significant federal dollars have been allocated to vehicle and infrastructure projects in California cities. The state is the test ground for manufacturers developing new vehicle technologies. A consortium of state, federal, and industry organizations are moving forward with a \$30 million dollar project to deploy 28 hydrogen fueling stations across California. To a lesser degree, South Carolina is another state that has benefitted from a state commitment to hydrogen technology.

Working with the State of Florida, explore opportunities to leverage support for natural gas infrastructure to initiate hydrogen research and development. With state leadership in place, the North Florida region's proximity to higher education institutions (UNF, JU, FSCJ, UF, etc.) positions it well to pursue funding for R&D and pilot projects. Facilitating coordination between the state, research institutions, industry and progressive fleet operators can present opportunities for demonstrating leadership on this emerging alternative fuel.

9.5. NATURAL GAS

Natural gas fuels can be cheaper than conventional fuels. They are significantly cleaner than gasoline or diesel and can play a role in reducing greenhouse gas emissions. While not produced in significant quantities in Florida, natural gas is increasingly produced in the United States, resulting in reduced reliance on foreign sources and increased investment in local communities. Natural gas infrastructure can also serve as the basis for hydrogen fuel systems.



The North Florida region is poised to significantly expand its use of natural gas fuels in the near future. Several new private and public CNG and LNG stations are operating or have been announced. These stations will be supported by large numbers of local fleet vehicles. The region's commitment to natural gas extends beyond on-road vehicles to the rail and maritime logistics sectors. These trends suggest a major role for natural gas to play in the region's future economic development.

Nevertheless, natural gas vehicles (including rail and maritime applications) are more expensive than conventional models. New, capital-intensive fueling infrastructure is required and local experience with this infrastructure is limited. As fleets of all kinds turn to natural gas, a shortage of skilled labor to maintain fueling infrastructure and equipment may develop.

The following strategies are recommended to surmount barriers to realizing the benefits of natural gas fuels in North Florida

N1. INCENTIVES FOR INCREMENTAL COST OF FLEET NATURAL GAS VEHICLES

Provide incentives to reduce the incremental cost of purchasing natural gas vehicles (NGVs) in public fleets or private fleets within proximity to future public stations.

CNG and LNG fuel is significantly cheaper than gasoline or diesel fuel on a GGE or DGE basis. However, the incremental cost of light and heavy duty NGVs is substantial. For this reason, vehicles with low fuel-economy and high rates of fuel consumption are good candidates for replacement with NGVs. For such vehicles fuel cost savings can offset high incremental costs relatively rapidly. Financial incentives that reduce incremental costs can help hasten investment in NGVs by raising the rate of return. They may also allow a wider variety of fleets convert. An added benefit is that large fleet operators or smaller, aggregated fleets can attract private investment in fueling infrastructure by committing to long-term replacement with NGVs.

Working with public and private fleets, identify hurdle rates for investment and develop financial incentives that can lead to long-term commitments to replace vehicles with NGVs. The North Florida TPO is providing funding to St. Johns County to help purchase medium-duty NGVs. The funding has been provided in conjunction with a County commitment to construct a CNG fueling complex with both public and private fuel dispensers. It is also working with the City of Jacksonville to explore funding for refuse vehicles fueled by CNG sourced from City landfills.

Currently no public CNG stations are in North Florida; however, several are expected to come on-line within the next year. The first LNG station opened in early 2014. Operators of public stations have an incentive to attract new demand. Working with operators, identify smaller fleets in proximity to future CNG stations or the LNG station at Lane Avenue and I-10 for whom financial incentives may be a decisive factor in the purchase of NGVs. Explore providing financial incentives, perhaps in partnership with station operators, to catalyze adopting natural gas fuels.

N2. ACCESS TO EXISTING STATIONS

Provide incentives to developers of private fueling stations to add public fueling dispensers to their projects or allow controlled access by other fleets.



For large fleets with high rates of fuel consumption, purchasing of NGVs and constructing of fueling facilities can make good business sense without any incentives.

For fleets of this size, it is often practical to establish private fueling facilities. However, the incremental cost of adding additional dispensers available to the public is less than building a separate station. Further, opportunities for generating revenues from public fuel sales can be significant.

Working with large public and private fleets that have made commitments to natural gas fueling, identify opportunities to fund a public fueling component. For example, the North Florida TPO has proposed to provide funding to the JTA to construct a public fueling station as part of its plan to purchase approximately 100 CNG transit buses and construct a private fueling facility. The public station is expected to be operational in 2015.

Additionally, specialty fleets such as transit buses and refuse trucks often only utilize their private fueling facilities during specific times of day (e.g. overnight). At other times, the facilities are idle. Providing controlled access to other fleets during these times can hasten return on investment in fueling infrastructure. It can also facilitate purchase of NGVs by organizations that are unable to invest in private fueling infrastructure. Such arrangements can also provide an emergency fuel source for fleets with private stations in the event they experience service interruption. The availability of emergency fuel sources reduces the risk of investing in natural gas fueling infrastructure and improves the reliability of using natural gas fuel throughout the community.

Helping to establish partnerships with and recognizing organizations that offer access to their natural gas fueling infrastructure highlights the economic, social and environmental benefits to the community and are examples for other organizations to follow.

N3. CNG AT LNG STATIONS

Work with operators of LNG stations to provide CNG.

LNG may be used to produce CNG on site via high pressure vaporization. In this manner, CNG can be produced at less cost than a standalone station in locations that do not have access to natural gas distribution pipelines.

Clean Energy Fuels Corporation opened an LNG station in Jacksonville in early 2014. As other sources of LNG emerge in the region (e.g. as part of a regional liquefaction and storage facility), opportunities may emerge for transporting LNG to locations not served by natural gas pipelines where it can be converted to CNG for vehicles.

As LNG providers expand in the region, financial and non-financial incentives may be identified that prompt station operators to provide a CNG fueling option.

N4. NATURAL GAS LOGISTICS HUB

Support development of North Florida as an international hub for multi-model transportation fueled by natural gas.

Natural gas is expected to fuel an increasing share of mid- to heavy-duty fleets in sectors such as sanitation, transit and various vocational applications. It is also expected to play a role in logistics, including trucking, rail transportation and shipping. Large volumes of LNG are required to meet the demands of these sectors. Proximity of LNG production to North Florida's port operations can facilitate using natural gas transportation technologies and may provide a competitive advantage to the region. Advantages include lower operating costs, cost-effective compliance with national and international air emissions requirements and access to new markets for fuel exports, among others. These advantages could lead to new industries and jobs in the region.



In 2013 Tote, Inc. / Sea Star Line and Crowley Maritime announced plans to operate four to ten LNG-fueled container ships from Jacksonville's port. Tote, Inc. awarded a contract to a joint venture composed of AGL Resources and WesPac Midstream LLC to supply LNG to its ships. Clean Energy Fuels Corporation has also announced plans to build a LNG fuel terminal designed for the transportation sector in the region. The terminals would be the first of its kind on the east coast. Meanwhile, JEA recently announced an agreement with Sempra U.S. Gas and Power to explore developing natural gas infrastructure in the region.

Driven in part by new international greenhouse gas and air quality mandates, JAXPORT's 2013 Strategic Plan calls for using LNG in Caribbean markets. It also suggests involving the private sector in developing LNG storage and bunkering capabilities.

Developing a regional shared vision for natural gas fuels among economic development leaders, logistics professionals, and elected officials, among other key stakeholders, can help ensure that Jacksonville's achieves an enduring competitive advantage. A vision could help determine what federal, state and/or local policies are needed, what facilities are required to supply the logistics industry, where to site facilities, how to market alternative fuel capabilities, and how to grow the region's logistics market share (e.g. bulk transport of fuel, transshipment, etc.) among other critical questions. On-going collaboration to realize synergies associated with LNG liquefaction, storage and bunkering facilities can lead to opportunities for expanded use of L/CNG in trucking, non-road applications, and establishing of L/CNG stations.

N5. SUPPORT WORKFORCE TRAINING

Work with industry stakeholders and educational institutions to develop a skilled workforce supporting natural gas vehicles and fueling infrastructure

North Florida's use of natural gas as a transportation fuel is growing rapidly. A specialized, skilled workforce will be required to maintain fleets and operate fueling stations.

Lively Technical Center in Tallahassee has incorporated certifications in CNG conversion and service into its automotive training curriculum. Graduates are helping to support natural gas infrastructure in the Capital region. This program provides a potential model for developing educational offerings in North Florida.

The workforce needs of the natural gas industry in North Florida must be identified and incorporated into the existing automotive training programs available from public and/or private educational institutions. Convening stakeholders with this purpose can ensure that North Florida's commitment to natural gas continues to flourish.

N6. DEVELOP REGULATORY POLICIES AND PROCEDURES TO FACILITATE DEVELOPING OF NATURAL GAS FUELING INFRASTRUCTURE

Facilitate collaboration between developers, owners and regulatory officials to establish reasonable and predictable processes for building natural gas fueling facilities.



In Florida, procurement, regulation and permitting of natural gas infrastructure is not yet well defined. Developers, owners and regulatory agencies may be inexperienced with alternative fuel infrastructure and unfamiliar with applicable specialized codes and standards. Providing a forum for project stakeholders to consult with one another early and frequently during the planning, design and construction of North Florida's initial projects can lead to best management practices appropriate for the region. Comprehensive planning, zoning, land development regulation and permitting all present opportunities to identify policies and procedures that promote development. Several states and regions have created permitting guides for prospective developers. Documenting and communicating best practices from "first-

mover” projects in the region can help create a regulatory and administrative environment that encourages continued growth in of the natural gas fuels sector.

9.6. PROPANE

Propane fueling is currently available in North Florida. The cost of private fueling infrastructure is relatively moderate and construction and regulation of such facilities is well understood. The incremental cost of propane vehicles is relatively low, and availability of OEM propane vehicles is expected to expand. The fuel is less carbon-intensive than gasoline and diesel. For these reasons, among others, Autogas is the third most utilized transportation fuel globally.



Despite these advantages, barriers have prevented Autogas from becoming mainstream in the U.S. and the region. A primary barrier is the nature of the industry. Local marketers are numerous, representing a mix of large and small operators serving diverse markets. Pricing is unregulated. As a result of such factors, the local market is highly competitive. This often limits cooperation and transparency, leading to the common observation that the industry is “its own worst enemy.” This dynamic has led to several consequences:

- The industry has been unable to promote propane as a transportation fuel as effectively as the natural gas industry.
- Available data on Autogas use (e.g. location of fueling infrastructure, Autogas sales volumes, Autogas prices, information on fleets, etc.), is limited due to its competitive value.
- Developing of public Autogas fueling infrastructure, and associated business and project delivery models have been slow due to potential threat to marketers’ sales.
- Marketers have also been reluctant to provide retail Autogas because of the effect on consumer perceptions. Autogas prices are lower than “bottle gas” due to transportation costs, regulation and other factors. This could lead to confusion among consumers.

The following strategies are recommended to outline the benefits of Autogas in North Florida.

P1. EDUCATION AND OUTREACH FOR FLEET OPERATORS

Educate public and private fleet operators on the benefits of Autogas.

The propane industry is characterized by a diverse, competitive network of marketers providing a variety of services, which include transportation fuel. For such reasons, the potential benefits of propane / Autogas to the transportation sector are not as widely known as other alternatives.

A compelling business case can be made for purchasing propane vehicles and developing fueling infrastructure for fleets. For large fleets of mid-duty vehicles, such as those employed by construction trades, telecommunications, and logistics companies, it may be particularly beneficial. Similarly, Autogas is well suited to school buses. The Putnam County School District has converted several school buses to operate on Autogas.

Working with fuel marketers, vehicle manufacturers and fleet operators to raise awareness of the Autogas benefits can help spur wider use in North Florida.

P2. INCENTIVES TO DEVELOP AUTOGAS FUELING STATIONS ACCESSIBLE TO REGIONAL FLEETS

Provide financial incentives to operators of existing private stations to make infrastructure available to regional fleets.

Local propane fueling infrastructure is extensive, but poorly defined. Anecdotally, nearly 50 stations operate in the region. Few are widely-accessible to fleet managers. Those that are do not typically offer competitive rates aimed at meeting the needs of fleets.

By equipping existing infrastructure with a fuel card reader, Autogas marketers and fleet managers can control fuel pump transactions. Such a system can allow marketers to maintain key fleet accounts, without introducing confusion in the residential services market. Equipping an existing Autogas dispenser with such a system could cost between \$20,000 and \$30,000.

Working with Autogas marketers and vehicle manufacturers, opportunities to upgrade existing private infrastructure can be identified. As accessible infrastructure is established, vehicle manufacturers can pursue opportunities to offer new vehicles or conversions to fleets.

P3. INCENTIVES FOR INCREMENTAL COST OF FLEET PROPANE VEHICLES

Provide incentives to public fleets to reduce the incremental cost of purchasing OEM propane vehicles or converting vehicles.

Propane fueling infrastructure already exists in North Florida and the incremental cost of mid-duty propane vehicles is moderate. Financial incentives that reduce the incremental costs of OEM or after-market vehicles can help hasten investment. Working with public fleets, including operators of school bus fleets, to identify hurdle rates for investment and develop financial incentives can lead to long-term commitments to Autogas vehicles.



10. PROJECTS

North Florida can reap the benefits of alternative fuels, vehicles and infrastructure by implementing strategies to overcome barriers to widespread use. With stakeholders of the North Florida Clean Fuels Coalition, a series of projects guided by the strategies presented in the previous section are being implemented to catalyze expansion of petroleum-alternatives in North Florida.

To date, projects have focused on broadening access to natural gas. These projects have helped establish this fuel as an economic development driver in the region. Moving forward, the Coalition intends to implement projects for all the alternative fuels, guided by the goals and strategies detailed in this Master Plan. Project implementation is supported by funding managed by the North Florida TPO. Funding sources of funding include the Transportation Regional Incentive Program (TRIP) and Congestion Mitigation and Air Quality program. Most recently, the North Florida TPO board has allocated \$1.15 in CMAQ for alternative fuels, vehicles and infrastructure projects.

The projects undertaken by the North Florida TPO to date and initiated by the Alternative Fuels, Vehicles and Infrastructure Master Plan are detailed below. In the future, additional projects may be added to this Master Plan.

10.1. ST. JOHNS COUNTY FLEET CONVERSION

The North Florida Clean Fuels Coalition will support converting fleet vehicles to CNG (**Strategy N1**). The North Florida TPO has executed a Memorandum of Understanding with St. Johns County providing \$732,000 to purchase approximately 130 mid-duty CNG fleet vehicles. The County will also pursue rebates from the State of Florida (up to 50 percent of the incremental cost of a vehicle, up to \$250,000 per entity, per year).



This funding has paved the way for the County to enter into a public private partnership (P3) for CNG fueling services. Under the P3, a private developer will design, build, operate and maintain a \$2 million CNG fueling facility to support the County's fleet. The County is expected to consume at least 100,000 GGE in the first year of operation and 125,000 GGE/year thereafter. In addition, under the terms of the MOU, the CNG fueling facility will be made accessible to the public (**Strategy N2**).

This will provide opportunities for smaller fleets in the region to utilize NGVs and for local regulatory agencies to become familiar with natural gas projects. As planning, design and construction proceed, lessons learned and best practices will be identified for natural gas fueling infrastructure (**Strategy N6**) in the region.

10.3. CITY OF JACKSONVILLE SANITATION VEHICLE CONVERSION

The North Florida Clean Fuels Coalition will support converting of sanitation vehicles to CNG. The North Florida TPO board has allocated \$315,000 to the City of Jacksonville to purchase up to seven CNG sanitation trucks. The funding will cover the incremental costs (approximately \$45,000) of the vehicles (Strategy N1).

The funding for vehicle conversions has made it possible for the City to pursue a project to produce CNG fuel from landfills. The City plan involves capturing landfill gas produced at two closed municipal landfills, where gas is created as a byproduct of waste decomposition. Approximately 40 percent to 60 percent of the gas is methane, the principal constituent of natural gas. The gas will be processed and compressed to produce CNG for vehicles use.



Using landfill gas in such a manner has substantial environmental benefits. Because the gas is produced from organic wastes, it is often considered a renewable energy source. This differs from natural gas extracted from geological formations, which is not considered renewable. As a renewable fuel, landfill gas does not contribute to anthropogenic greenhouse gas emissions and is considered “carbon-neutral.”

10.4. JACKSONVILLE TRANSPORTATION AUTHORITY PUBLIC ACCESS CNG STATION

The North Florida Clean Fuels Coalition supporting development of a public access CNG station. The North Florida TPO Board, in its capacity as the regional Transportation Regional Incentive agency, has allocated \$2.75 million in TRIP funds for the JTA. The Authority will use the funds to partially fund a multi-million dollar project to procure approximately 100 CNG transit buses (Strategy N1), develop a private CNG fueling facility and modify its maintenance facilities to accommodate the new buses. The funds are contingent upon JTA also constructing a public-access CNG fueling facility (Strategy N2).



The funds have been instrumental in JTA opting to pursue a P3. Similar to the P3 being pursued by St. Johns County, a developer will design, build, operate and maintain a fueling facility to serve the JTA fleet. This facility is expected to supply at least 140,000 DGE in the first year, increasing to about 1 million DGE in year five. In addition, the developer will design, build, operate and maintain a separate fueling facility dedicated to serving the public needs.

As with the St. Johns County project, the new station will allow other fleets to utilize NGVs. The project will also allow local regulatory agencies to become familiar with natural gas projects. As with the St. Johns County project, lessons learned and best practices related to regulating natural gas fueling infrastructure (Strategy N6) will be documented.

10.5. FLORIDA EAST COAST RAILWAY FREIGHT LOCOMOTIVE CONVERSION

The North Florida TPO board is contributing approximately \$375,000 towards a Florida East Coast Railway (FEC) pilot project. The pilot project will test use of four LNG-diesel hybrid locomotives and two tender cars along a 116-coordidor south of Jacksonville. The project is expected to displace approximately 80 percent of the current operation's diesel use. The North Florida TPO funding will purchase one of the four kits required to retrofit the locomotives.



This funding has been instrumental to FEC in implementing its pilot project on the northern segment of its network rather than the southern segment. The pilot has the potential to demonstrate the business case for LNG in the freight logistics sector. Using of LNG in this sector supplements recent announcements to develop LNG liquefaction, storage and fueling facilities in Jacksonville and bolsters the region's vision to become a hub for logistics powered by affordable and clean alternative fuels (Strategy N4).

10.6. ELECTRIC VEHICLE CHARGING NETWORK

The North Florida Clean Fuels Coalition will fund a regional Electric Vehicle network. The North Florida TPO has budgeted \$300,000 to purchase and install approximately 25 - 30 electric vehicle charging stations (Strategy E2). These stations will support the region's current 267 registered EVs and more rapid purchase of vehicles. Currently the growth rate of EV registrations in the region is over 50 percent a year.



The North Florida TPO, through the North Florida Clean Fuels Coalition, is developing a partnership with JEA to help design, build, operate and maintain the station network. Stations will be deployed throughout JEA's service territory, which includes portions of Duval and St. Johns Counties. Stations will be located based stakeholder input using a siting analysis (Strategy E1).

The NFCFC is also assisting JEA with its long-term strategy for promoting EVs and EVSE, which involve incentives for purchase of EVs (Strategy E3), potentially, new rate structures (Strategy E4).

Together with other North Florida Clean Fuels Coalition stakeholders, the network will be branded and marketed throughout Northeast Florida, potentially complemented by roadway signage (Strategy E5).

As the project planning and implementation proceeds, the North Florida TPO will work closely with regulatory agencies. In the process, lessons learned and best practices will be identified (Strategy E6).

10.7. EDUCATION AND AWARENESS EVENTS

The North Florida Clean Fuels Coalition will continue to pursue a diverse agenda of education and awareness events aimed at overcoming barriers to adopting alternative fuels, vehicles and infrastructure. Past events have been very successful, contributing to nationwide recognition of the region's commitment to petroleum alternatives. Future events will raise general understanding of the challenges and opportunities, while also providing focus on biofuels (**Strategy B1**), electric vehicles (**Strategy E5**) and propane / Autogas (**Strategy P1**).

The North Florida TPO held the second *Florida Alternative Fuel Vehicles Expo*, October 31, 2013. Attended by over 150, the expo displayed varied alternative fuel vehicles among them a hybrid-electric bus, a CNG refuse truck, light-duty CNG and propane trucks, and electric passenger vehicles. It also featured speakers from NovaCharge, St.



Johns County, Roush, and Clean Energy on electric vehicles, biodiesel, propane and natural gas. The meeting also featured the official launch of the North Florida Clean Fuels Coalition. An Expo is currently being planned for October 2014. (**Strategy B1**, **Strategy E5**, **Strategy P1**)



Over 100 attended the North Florida Clean Fuels Coalition's *Drive Electric Rally* April 8, 2014. EV owners proudly displayed their electric and plug-in electric vehicles. Owners were invited to discuss the region's EVSE infrastructure and to share their preferences on how and where it should be improved. JEA provided an update on its emerging vision for supporting EVs and EVSE in its service territory. The event provided the North Florida Clean Fuels Coalition access to a large, local group of enthusiastic and committed EV and PHEV owners, whose input will be solicited on future Coalition efforts

(**Strategy E5**).

Responding to the input of propane / Autogas stakeholders, the North Florida Clean Fuels Coalition is currently planning a series of educational / awareness events aimed at the commercial and education sectors. (**Strategy P1**). The North Florida Clean Fuels Coalition will also seek out opportunities to raise education and awareness among the region's political leaders and government agencies with respect to biodiesel (**Strategy B1**).

APPENDIX

DEFINITIONS

ALTERNATIVE FUEL: The Energy Policy Act of 1992 defines an alternative fuel as biodiesel, natural gas, propane, electricity, hydrogen, ethanol, among others.

ALTERNATIVE FUEL VEHICLE: A dedicated, flexible fuel or dual-fuel vehicle designed to operate on at least one alternative fuel.

AUTOGAS: Propane used as a transportation fuel.

BI-FUEL VEHICLE: A vehicle designed to run on two unblended fuels, either simultaneously (i.e. in parallel) or one-at-a-time. Bi-Fuel, or dual fuel, vehicles typically combine gasoline or diesel with alternative fuels such as natural gas, propane or hydrogen.

BIODIESEL: Vegetable oil or animal fat based diesel fuel used as an alternative to petroleum-based diesel fuel.

CARBON DIOXIDE (CO₂): A naturally occurring chemical compound of two oxygen atoms and one carbon atom. Carbon dioxide is produced as a result of combustion of fossil fuels, fermentation of sugars and respiration of living organisms. In the atmosphere carbon dioxide acts as a long-lived (e.g. 200 years) greenhouse gas. Human activities following the industrial revolution have significantly increased atmospheric concentration of carbon dioxide in the atmosphere, leading to global warming.

CARBON DIOXIDE EQUIVALENT (CO₂E): A quantity that describes the amount of carbon dioxide that would have the same global warming potential when measured for a specified timescale (e.g. 100 years) for a given mixture and amount of greenhouse gas. It allows different emissions streams to be compared on a common basis.

CELLULOSIC ETHANOL: A type of ethanol produced from wood, grasses or other inedible (i.e. by humans) parts of plants.

CLIMATE CHANGE: Significant and lasting change in the distribution of weather patterns over long periods of time due to global warming.

COMPRESSED NATURAL GAS (CNG): Natural gas that is dried, filtered and compressed to about 3,600 pounds per square inch for use as an alternative to gasoline and diesel fuels. It is less energy dense than LNG.

CRITERIA AIR POLLUTANTS: A set of air pollutants regulated by the clean air act that cause smog, acid rain and several other health hazards. They are typically emitted from industry, mining, transportation, electric generation and agriculture activities.



DIESEL GALLON EQUIVALENT (DGE): The amount of alternative fuel it takes to equal the energy content of one liquid gallon of diesel. It allows common comparisons between standard and alternative fuels.

ELECTRICITY: The set of physical phenomena associated with the presence and flow of electric charge. In an electric vehicle, this charge is utilized to energize one or more electric motors for propulsion.

ELECTRIC VEHICLE SUPPORT EQUIPMENT: Equipment required to supply electricity for charging the batteries of electric or plug-in electric hybrid vehicles.

ETHANOL: A volatile, flammable, colorless liquid used as an alternative to gasoline. Ethanol is produced from a variety of feedstocks, including corn, sugar cane, sweet sorghum and so-called “cellulosic” feedstocks.

FLEX FUEL VEHICLE: Vehicles designed to run on gasoline or a blend of up to 85 percent ethanol.

FUEL CELL: A device that converts the chemical energy from a fuel into electricity through a reaction with an oxidizing agent. Hydrogen is the most common fuel cell. It differs from a battery in its requirement for a constant source of fuel and an oxidizer.

FUEL ECONOMY: A ratio between the distance a vehicle travels and the amount of fuel consumed by the vehicle, commonly expressed in miles per gallon. Fuel economy of light-duty vehicles in the United States is regulated by the Corporate Average Fuel Economy standards administered by the EPA.

GASEOUS GALLON EQUIVALENT (GGE): The amount of alternative fuel it takes to equal the energy content of one liquid gallon of gasoline. It allows common comparisons between standard and alternative fuels.

GLOBAL WARMING: An unequivocal and continuing rise in the average temperature of earth’s climate system, including both the air and sea. Since the early 20th century, global air and sea surface temperatures have increased by about 1.4°F, with about 66 percent occurring since 1980. Climate scientists are more than 90 percent certain that most global warming is a consequence of increased greenhouse gas concentrations resulting from human activities, such as combustion of fossil fuels.

GREENHOUSE GAS: An atmospheric gas that absorbs and emits radiation within the thermal infrared range. As a whole, these gases are responsible for the greenhouse effect, which greatly affects the earth’s temperature. The primary greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide and ozone.

HEAVY-DUTY VEHICLE (HDV): A truck with a gross vehicle weight rating above 26,000 pounds. This category includes most tractor trailer trucks, transit buses and many vocational vehicles (e.g. refuse trucks).



HYDROGEN: The most abundant and lightest chemical substance in the universe. Hydrogen may be used as an energy carrier in conjunction with fuel cell electric vehicles.

INTERNAL COMBUSTION ENGINE: An engine that utilizes combustion of fuel and an oxidizer (e.g. Air) in a chamber to convert chemical energy to mechanical energy.

LIGHT-DUTY VEHICLE (LDV): Passenger vehicles and trucks with a gross vehicle weight ranging from 0 to 14,000 pounds (e.g. Ford F-350)

LIQUEFIED NATURAL GAS (LNG): Natural Gas that is purified and cooled to -260°F for an alternative to gasoline and diesel fuels. It is more energy-dense than CNG.

MEDIUM-DUTY VEHICLE: A truck with a gross vehicle weight rating ranging from 14,001 (e.g. a Ford F-450) to 26,000 pounds (e.g. a Ford F-650).

NATURAL GAS: A non-renewable hydrocarbon gas mixture formed from geologic deposits of organic material. The principal constituent is methane. It may be compressed or liquefied as an alternative to gasoline or diesel fuels.

ORIGINAL EQUIPMENT MANUFACTURER: The company that originally manufactured the product. OEM products or components are often purchased by another company, modified and retailed under that purchasing company's brand name.

OCTANE: A short form of "octane rating" that measures the performance of motor fuels in gasoline internal combustion engines. The higher the octane number, the more compression the fuel can withstand before igniting.

PROPANE: A gas by product of natural gas processing and petroleum refining that is compressible to a transportable liquid used as an alternative to gasoline and diesel fuels.

PROPERTY ASSESSED CLEAN ENERGY FINANCING: A means of financing energy efficiency or renewable energy projects with funding secured by annual property tax assessments.

RANGE: The distance a vehicle can travel between fueling episodes based on the size of its fuel tank, the energy content of the fuel and the vehicle's fuel economy, among other factors.

RENEWABLE FUEL STANDARD: A federal program administered by the EPA that requires refiners, importers and blenders of gasoline and diesel to sell a certain volume of renewable fuel every year. .

ZERO EMISSIONS VEHICLE (ZEV): A vehicle that emits no tailpipe pollutants from the onboard source of power as certified by the California Air Resources Board. The definition does not include emission from well-to-well (i.e. emissions produced during electricity generation).



ACRONYMS

AF:	Alternative Fuel
ASTM:	American Society for Testing and Materials
AFV:	Alternative Fuel Vehicle
B5:	A fuel blend composed of 95 percent petroleum diesel and 5 percent biodiesel
B20:	A fuel blend composed of 80 percent petroleum diesel and 20 percent biodiesel
CMAQ:	Congestion Mitigation and Air Quality Improvement Program
CO:	Carbon Monoxide
CO₂:	Carbon Dioxide
CO₂e:	Carbon Dioxide Equivalent
CNG:	Compressed Natural Gas
DGE:	Diesel Gallon Equivalent
DOE:	United States Department of Energy
DOT:	United State Department of Transportation
E85:	A fuel blend composed of 15 percent gasoline and 85 percent ethanol
EPA:	United States Environmental Protection Agency
EV:	Electric Vehicle
EVSE:	Electric Vehicle Support Equipment (e.g. an electric vehicle charging station)
GGE:	Gaseous Gallon Equivalent
GHG:	Greenhouse gas
HDV:	Heavy-duty Vehicle
HEV:	Hybrid Electric Vehicle
ICE:	Internal Combustion Engine
JTA	Jacksonville Transportation Authority
LDC:	Local Distribution Company
LDV:	Light-duty Vehicle
LNG:	Liquefied Natural Gas
MPGGE:	Miles per Gaseous Gallon Equivalent
NFCFC:	North Florida Clean Fuels Coalition
TPO:	Transportation Planning Organization
NGV:	Natural Gas Vehicle
NO_x:	Oxides of Nitrogen
OEC:	Orlando Utilities Commission
OEM:	Original Equipment Manufacturer
PACE:	Property Assessed Clean Energy Financing
PHEV:	Plug-in Electric Hybrid Vehicle
PM:	Particulate Matter
SAE:	Society of Automotive Engineers
VOC:	Volatile Organic Compound
ZEV:	Zero Emission Vehicle



MEETING MINUTES

Propane Working Group Meeting Minutes



Date: 21 Mar 2014
Project Name: North Florida Clean Fuels Coalition
Place: North Florida Transportation Planning Organization (North Florida TPO)
Time: 9:00 AM – 11:30 AM
Subject: Propane Working Group Meeting.
Attendees: Wanda Forrest (WF), Ben Moore (BM), Chris Burchell (CB), David Bruderly (DB), Melvin Luciano (ML), Romero Sincere (RS), John Edden (JE)

1. WELCOME & INTRODUCTION

1.1. Attendees:

- 1.1.1. Wanda Forrest, Transportation Planning Manager, North Florida TPO, wforrest@northfloridatpo.com, (904) 306-7514.
- 1.1.2. Ben Moore, Energy & Sustainability Planner, RS&H, ben.moore@rsandh.com, (904) 256-2348
- 1.1.1. Chris Burchell, Sales, AmeriGas, Chris.burchell@amerigas.com, (904) 465-4248. Locally known as Sawyer Gas. He works on residential and commercial markets. Has helped Metrolawn convert to propane. One market he is focused on is lawn maintenance companies. He offers a Kawasaki conversion kit for lawn maintenance equipment. He is also working with Roush on automobile conversion. In addition he is doing outreach to fleets and dealerships regarding propane conversions.
- 1.1.2. David Bruderly, Owner, Bruderly Engineering Associates, bruderly@aol.com, (352) 281-2696
- 1.1.3. Melvin Luciano, Owner, Progasco, Corp. and D&D Gas, Inc., progascocorp@bellsouth.net, (904) 725-8144. He has been working in the industry for 28 years. He is a dealer of XSI technology, which is an after-market, dual-fuel, not OEM, automobile conversion product.
- 1.1.4. Romero Sincere, Manager of Government Affairs, Florida Public Utilities, rsicre@fpuc.com, (561) 601-6311. Working on making sure state rebates for propane and natural gas are utilized and reauthorized for next year.
- 1.1.5. John Edden, Tarantin, johne@tarantin.com, (904) 477-7950. He has 35 years in the gas industry; with a focus on infrastructure.

1.2. Introduction

- 1.2.1. WF: Described purpose of the meeting: 1) identify potential new stakeholders to participate in the Propane Working Group (PWG), 2) review and provide input on the North Florida Alternative Fuels, Vehicles and Infrastructure Plan (master plan), including the most accurate data possible on propane use in the region, and potential edits to the plan 3) identify projects for potential North Florida TPO funding, including potential market (or other) barriers, and 4) discuss the role of the Working Group going forward.

2. POTENTIAL NEW MEMBERS

2.1. BM & WF: Asked attendees to identify potential new members of the Working Group. These would be invited to the follow up meeting and be included in the North Florida TPO's efforts on propane moving forward.

2.2. The following potential new members were identified by the Working Group:

2.2.1. Florida Propane Gas Association (FPGA), David Rogers and Dell Calhoun

2.2.2. Florida Natural Gas Association, David Rogers and Dell Calhoun

2.2.3. Northeast Florida Propane Gas Association. ML noted that he would provide a contact for this organization at a later date.

2.2.4. Chevy and Ford Dealers

2.2.5. While not an identifiable potential new member at this point, RS & DB noted that Motor Fuelers was a company that operated and maintained propane fueling stations around the state in the past, including Miami-Dade airport. There was widespread use of propane and natural gas in the state in 1970s, however, the industry waned. Lack of skilled tradespeople and lack of utilities ability to rate-base investment in the transportation market contributed to decline in the industry.

3. ALTERNATIVE FUELS, VEHICLE AND INFRASTRUCTURE MASTER PLAN

3.1. The PWG began by discussing the sections of the master plan regarding trends and the state of the North Florida region (3. Context, 3.2 Baseline, 3.3 Forecast, 8. Goals).

3.1.2. ML: Progasco Corp operates 3 propane vehicles not presently included in the master plan: Chevy 3500, Ford F250 and E250. Together they consume approximately 4600 gal / year

3.1.3. ML: D&D Gas operates 3 propane vehicles: Ford F700, F450, and F550

3.1.4. ML: It only takes 3 – 4 vehicles to justify installation of a dispensing unit or approximately 4,000/gpy.

3.1.5. ML & JE: Propane marketers are generally reluctant to share data on customers' usage because of competition. Competitors can use any published data to identify new customers and underbid the price currently paid for propane. This is a consequence of the price of propane being unregulated. The Working Group agreed that the identity of clients should remain anonymous in the master plan.

3.1.6. WF: There are 3 propane school buses in use in Putnam County that are not presently included in the master plan.

3.1.7. WF: W.W. Gay has approximately 15-20 propane vehicles in its fleet.

3.2. The PWG discussed the Infrastructure section of the master plan (6. Infrastructure)

3.2.1. ML: He believes that Thompson Gas set up Veolia's fueling system. It supports a fleet of taxis.

3.2.2. JE: There are actually 40 to 50 stations; he recommended the North Florida TPO contact FPGA (Dell Calhoun) for data. This conflicts with information available on the Alternative Fuel Data Center website. Apparently, knowledge about the location and distribution of propane fueling locations is not adequately communicated in the region.

3.2.3. JE: Flying J centers have propane dispensers.

- 3.2.4. ML: It is difficult to widely market Autogas because it is less expensive than residential services. It is less expensive because of transportation costs and regulation associated with delivering propane to the residential market. Marketers are concerned about confusing residential customers with prices for Autogas and for residential service.
 - 3.2.5. ML: Region-wide network of propane fueling is not essential. It is more important for propane marketers to develop private fueling for fleets. This allows them to “lock-in” sales. Developing public fueling infrastructure could threaten marketers’ sales of propane to fleets for which they have installed private fueling infrastructure.
 - 3.3. The PWG discussed the Regulation section of the master plan (7. Regulation)
 - 3.3.1. RS: Expects federal tax credits to return for propane and other alternative fuels.
 - 3.3.2. JE: The State Propane Education and Research Council offers rebates for propane conversions (e.g. lawnmowers). These rebates are not included in the draft master plan.
 - 3.4. The PWG discussed the Strategies section of the master plan (9. Strategies)
 - 3.4.1. DB: Modify education to include outreach to CFO-level decision makers.
 - 3.4.2. RS: Ensuring adequate supply for the region is an important consideration given the shortage of propane experience during the 2013/2014 winter.
 - 3.4.2.1. JE: The propane shortage in 2013/2014 was a perfect storm and will not happen again. It is not essential to include in plan. The PWG agreed with this point.
 - 3.4.3. BM: Should there be a strategy for a network of public dispensers in the region?
 - 3.4.3.1. CB: Yes, it would be useful in selling propane to fleet operators.
 - 3.4.3.2. ML: There are pricing issues as a result of propane being an unregulated industry (See 3.2.4).
 - 3.4.3.3. JE: It will be difficult to get marketers to agree on such a strategy because it is an unregulated industry (See 3.2.4 and 3.2.5).
 - 3.4.3.4. DB: Why would local propane industry not be able to mirror the P3 business model being used in the CNG industry (e.g. utilize a major consumer of propane as an anchor for a private / public station developed and funded by a third-party operating under a long term lease and concession contract that guarantees a baseline level of fuel sales, plus certain rights to additional public sales)? JE: It could be possible to mirror the CNG P3 business model. CB: It should be possible to mirror the CNG P3 business model.
4. IDENTIFY POTENTIAL PROJECTS FOR IMPLEMENTATION
- 4.1. Education
 - 4.1.1. DB: Workforce training could be an important benefit to the industry (See 2.2.5). CB: W.W. Gay has its own mechanic on staff. Large fleets will want to have their own trained mechanics on staff.
 - 4.1.2. JE: Training for station operators is also important.
 - 4.1.3. ML: An event or exposition targeted at key markets for conversion (e.g. MEP contractors) could be useful.
 - 4.2. Infrastructure



4.2.1. CB: A regional network of fueling stations is important to convince fleet managers to convert. In many cases there is not enough room on their lot to support private infrastructure. There is also a need to support the logistics of fleets that are not necessarily operated on a hub-and-spoke model, or travel over ranges that exceed the capacity of a full tank. Propane dispensers located at the intersections of I-10, I-95 and I-295 could be one strategy.

Natural Gas Meeting Minutes



Date: 21 Mar 2014
Project Name: North Florida Clean Fuels Coalition Planning
Place: North Florida Transportation Planning Organization (North Florida TPO)
Time: 1:00 PM – 3:00 PM
Subject: NCFCC Propane Working Group Meeting.
Attendees: Wanda Forrest (WF), Ben Moore (BM), Jim Quina (JQ), Becky Hiers (BH), Scott Skinner (SS); Dwayne Van Lancker (DVL); Buzz Hoover (BH); David Bruderly (DB); Kenneth Hernandez (KH); Andy Salcines (AS); Walt Bussesls (WB); Jessica Ligator (JL), Jeff Foster (JF)

1. WELCOME & INTRODUCTION

1.1. Attendees:

- 1.1.1. Wanda Forrest, Transportation Planning Manager, North Florida TPO, wforrest@northfloridatpo.com, (904) 306-7514.
- 1.1.2. Ben Moore, Energy & Sustainability Planner, RS&H, ben.moore@rsandh.com, (904) 256-2348
- 1.1.3. Dwayne Van Lancker, private citizen, dwaynev@coj.net, (904) 540-0512. DvL has built and operated a biofuels plant at the City of Jacksonville (COJ). He attended the meeting as a private citizen, rather than as a representative of COJ.
- 1.1.4. Jim Quina, Chief Engineer, Keystone Energy Solutions (KES), jimquinape@comcast.net, (904) 207-6900. KES is a compressed natural gas (CNG) station developer. JQ expressed an interest in building markets for groups of stations.
- 1.1.5. Becky Hiers, Engineering Services, Nassau County, bhiers@nassaucountyfl.com,
- 1.1.6. Scott Skinner, Environmental Manager, JAXPORT, scott.skinner@jaxport.com, (904) 357-3027. JAXPORT is fielding new interest related to LNG powered vessels and CNG powered trucking and associated infrastructure from its customers and tenants.
- 1.1.7. Buzz Hoover, Vice President of Petroleum Supply, Gate Petroleum, rbhoover@gatepetro.com, (904) 448-2922. Gate is continuing to explore offering CNG at stations.
- 1.1.8. David Bruderly, Owner, Bruderly Engineering Associates, bruderly@aol.com, (352) 281-2696



- 1.1.9. Andy Salcines, Vice President of Construction, NoPetro, asalcines@nopetro.com, (786) 873-8024. NoPetro is a developer of CNG infrastructure.
- 1.1.10. Walt Bussells, Chief Financial Officer, NoPetro, wbussells@nopetro.com, (904) 699-4745.
- 1.1.11. Kenneth Hernandez, Alternative Fuels Program Manager, TECO, kxhernandez@tecoenergy.com, (813) 228-1392
- 1.1.12. Jessica Ligator, Project Manager, JTA, jligator@jtafla.com, (904) 630-3119
- 1.1.13. Jeff Foster, Chief of Solid Waste Division, COJ, jsfoster@coj.net, (904) 255-7512
- 1.2. Introduction
 - 1.2.1. WF: Described purpose of the meeting: 1) identify potential new stakeholders to participate in the Natural Working Group (NWG), 2) review and provide input on the North Florida Alternative Fuels, Vehicles and Infrastructure Plan (master plan), including the most accurate data possible on use of natural gas in the region, and potential edits to the plan 3) identify projects for potentially North Florida TPO funding to projects, including potential market (or other) barriers, and 4) discuss the role of the NWG going forward.
2. POTENTIAL NEW MEMBERS
 - 2.1. BM & WF: Asked attendees to identify potential new members of the Working Group. These could be invited to the follow up meeting, if one is held, and be included in the North Florida TPO's efforts on natural gas moving forward.
 - 2.2. The following potential new members were identified by the Working Group:
 - 2.2.1. Alan Mosley, JAXChamber
 - 2.2.2. A representative from St. Johns County
 - 2.2.3. Fleet managers w/ an interest in conversion to natural gas
 - 2.2.4. CNG/LNG Vehicle suppliers
 - 2.2.5. Aftermarket CNG/LNG vehicle conversion companies
 - 2.2.6. A representative of the Florida Trucking Association
3. ALTERNATIVE FUELS, VEHICLE AND INFRASTRUCTURE MASTER PLAN
 - 3.1. The PWG began by discussing the sections of the master plan that deal with trends and the state of the North Florida region (3. Context, 3.2 Baseline, 3.3 Forecast, 8. Goals).
 - 3.1.1. SC: EPA Smartway Program maintains a database of fleets that are using alternative fuels
 - 3.1.2. AS: The Florida Trucking Association may be able to share relevant data.
 - 3.1.3. DvL: Add 15 sanitation trucks at COJ which will use CNG (5 in 2014; 10 in 2015)
4. IDENTIFY POTENTIAL PROJECTS FOR IMPLEMENTATION
 - 4.1. Education
 - 4.1.1. JO: Promote local education for vehicle maintenance best practices and technicians (e.g. at local technical colleges).
 - 4.1.2. KH: Training for vehicle mechanics will come as a consequence of supply and demand of natural gas vehicles; it is not a priority.



- 4.1.3. AS: Agreed that training for mechanics for vehicles is coming. There is a need is for mechanics to support fueling infrastructure. He recommended working with FSCJ to develop natural gas fueling infrastructure operations and maintenance training programs based on models established elsewhere (e.g. Lively Technical Center in Tallahassee).
 - 4.1.4. JO: Any events or expositions coordinated by the North Florida TPO should focus on educating municipalities (e.g. at the CFO level and also at the fleet operations level). The complexities of natural gas fueling infrastructure and project delivery methods are not well understood. Subjects would include issues such as project delivery as well as infrastructure and logistics (e.g. mother-daughter stations).
- 4.2. Fleets
- 4.2.1. JO: EPA conversion kits are available for trucks / power units after model year 2008. How will conversion for trucks / power units of a model year prior to 2008 be converted, since EPA does not certify them? It is necessary to work with institutions like Lively Technical Institute to identify inexpensive means of doing conversions for these kinds of vehicles.
 - 4.2.2. KH: OEMs are rapidly moving to provide a full range of CNG/LNG vehicles to meet demand.
 - 4.2.3. KH: Funding to support procurement of CNG/LNG vehicles (which cost more than standard vehicles) should be the priority of the North Florida TPO's financial support for natural gas.
- 4.3. Infrastructure
- 4.3.1. DV: It is important to focus on the local regulatory process to ensure that natural gas vehicles and infrastructure are encouraged. BH: The state has made progress on this front through its offering of incentives for vehicle conversion.
 - 4.3.2. JO: It is important to develop the ability to viably build stations based on a demand of 200 gallons per day. Mother / daughter stations, featuring central compression, drying, etc. and tube trailers distributing CNG to the location of public demand (i.e. daughter) is one possible solution. A municipality could be a base load (i.e. mother) and receive a discount on fuel.
 - 4.3.3. JF: Plans to develop a CNG station configured similarly to a Mother / Daughter arrangement are being developed. The mother station would be located at 2 closed COJ landfills. The CNG station would fuel 15 solid waste vehicles. It is expected to produce 14,000 gallons per day of CNG. Plans include eventually tapping the Trailridge landfill, which would provide another 10,000 gallons per day. Each solid waste vehicle consumes about 45-50 gallons today. The daughter station would be located at the Solid Waste Division headquarters, which is where the vehicles are maintained. Public access is being contemplated for the excess capacity. There is also a need for assistance funding conversions of vehicles. An RFP for engineering the stations is going out in two weeks. An RFP for CNG trucks is going out next week.
 - 4.3.4. JF: The COJ is requesting support to convert vehicles (See 4.3.3).
 - 4.3.5. JO: How do private government CNG facilities operate most efficiently? Is it possible for municipalities to sell wholesale CNG? How do municipalities take advantage of its access to low cost capital? Can we aggregate public demand?



Electric Working Group Meeting Minutes



Date: 28 Mar 2014
Project Name: North Florida Clean Fuels Coalition
Place: North Florida Transportation Planning Organization (North Florida TPO)
Time: 9:00 AM – 11:00 AM
Subject: Electric Working Group
Attendees: Wanda Forrest (WF), Ben Moore (BM); David Dunkley (DD); Will Rigsby (WR); Peter King (PK), Marci Larson (ML)

1. WELCOME & INTRODUCTION

1.1. Attendees:

- 1.1.1. Wanda Forrest, Transportation Planning Manager, North Florida TPO, wforrest@northfloridatpo.com, (904) 306-7514.
- 1.1.2. Marci Larson, Public Affairs Manager, North Florida TPO, mlarson@northfloridatpo.com, (904) 306-7513
- 1.1.3. Ben Moore, Energy & Sustainability Planner, RS&H, ben.moore@rsandh.com, (904) 256-2348
- 1.1.4. David Dunkley, Planner & Environmental Coordinator, JAA, david.dunkley@flyjacksonville.com, (904) 741-2744
- 1.1.5. Will Rigsby, Director of Channels and Technical Relations, NovaCharge, willrigsby@novacharge.net, (404) 229-3606
- 1.1.6. Peter King, Customer Solutions, JEA, kingpl@jea.com, (904) 630-8871

1.2. Introduction

- 1.2.1. WF & BM: Described purpose of the meeting: 1) identify potential new stakeholders to participate in the Electric Working Group (EWG), 2) review and provide input on the North Florida Alternative Fuels, Vehicles and Infrastructure Plan (master plan), including the most accurate data possible on electricity use in the region, and potential edits to the plan 3) identify projects for potential North Florida TPO funding, 4) identify potential market (or other) barriers, and 5) discuss the role of the EWG going forward.

2. POTENTIAL NEW MEMBERS

- 2.1. BM & WF: Asked attendees to identify potential new members of the Working Group. These could be invited to the follow up meeting, if one is held, and be included in the North Florida TPO's efforts on natural gas moving forward.
- 2.2. The following potential new members were identified by the Working Group:
 - 2.2.1. Dealers, e.g. Jerry Hamm, Chevrolet
 - 2.2.2. Beaches Energy

3. ALTERNATIVE FUELS, VEHICLE AND INFRASTRUCTURE MASTER PLAN

- 3.1. The PWG discussed the Infrastructure section of the AFV&IP (6. Infrastructure)
 - 3.1.1. WR: Will provide supplemental info on EV charging projects that are in progress (that he can disclose publicly).



- 3.2. The PWG discussed the Regulation section of the master plan (7. Regulation)
 - 3.2.1. WR: Federal financial incentives (e.g. tax incentives) are still available for electric vehicles.
 - 3.2.2. WR: The tax credit for home charging infrastructure is still available; the commercial incentive has expired.
4. IDENTIFY POTENTIAL PROJECTS FOR IMPLEMENTATION
 - 4.1. Education / Awareness
 - 4.1.1. The EWG agreed that Education / Awareness events / projects such as the Drive Electric Rally planned by the North Florida TPO April 8, 2014 are the right kind of projects to implement.
 - 4.2. Electric Vehicle Charging Support Equipment (EVSE)
 - 4.2.1. DD: David suggested charging station(s) at the airport. WR: At the Greater Orlando Aviation Authority, Orlando Utility Commission installed and owns several stations. There is a Valet service for charging stations at the Tampa and Charlotte airports. Level 1 chargers (Cost: ~\$500) could be installed if associated with a valet service. DD: There is a valet service at JAA that may be open to installing chargers. If the North Florida TPO offered to help fund the project, JAA could potentially cover the cost of electricity and charge \$0.00/kwh.
 - 4.2.2. BM: Would it be possible to interest the rental car industry in having EVs, particularly at the airport? This would follow a model established by Drive Electric Orlando, a partnership between rental car agencies, hotels, and tourist attractions to promote EVs and EV infrastructure to tourists and business travelers. DD: Will research the rental car industry interest. WR: Enterprise had a fleet of Nissan Leafs at Gainesville, but has apparently moved them out of town due to lack of charging infrastructure in town. He will attempt to find out if Enterprise would move any to Jax.
 - 4.2.3. The EWG agreed that reaching out to hotels and restaurants is important. ML: Will reach out to contacts at Visit Jacksonville and Omni Hotel Amelia Island
 - 4.2.4. The EWG agreed that siting charging stations at JU and/or UNF could be viable. BM: offered to reach out to Ashley Johnson and James Taylor at JU and UNF respectively on this topic.
 - 4.2.5. PK: Will reach out to Beaches Energy / City of Jacksonville Beach (e.g. Steve Lindorf) regarding their interest in supporting EV infrastructure. The EWG agreed that EV charging locations at the Atlantic / Neptune Town Center and in the proximity of A1A and Beach Boulevard could be feasible. (See 2.2.2).
 - 4.2.6. The EWG agreed that working with employers to site EVSE at workplaces throughout the region is beneficial. PK: JEA is working on an EVSE demonstration project at JEA's downtown parking complex in downtown Jacksonville. There will be a charging station on 6th floor. JEA is also working to acquire 1 or 2 EVs. WF: Recommended leveraging the North Florida TPOs Cool to Pool program to identify potential employers interested in EVs and EVSE. ML: There is a new EV charging station installed at Deutsche Bank's offices on the Southside as of Tuesday. It is a private station. WR: Fidelity National Financial has plans to install a private station at its Riverside location.

WR: EVSE equipment has been ordered by the City of Jacksonville and is being warehoused. CSX is waiting for City Council approval for COJ grant funding to pay for the cost of installation. At that time, publicly-accessible EVSE will be installed in the Water Street Garage in downtown Jacksonville. CSX will promote its use to its employees. ML: Will contact Neil Morgan, Assistant Director of Security at Mayo Clinic to gauge interest in EVSE. The EWG agreed that the Jax Chamber should be included in efforts to work with the business community on EVSE. Alan Mosley would be a good contact there. The EWG agreed that EVSE could be sited at NAS Jacksonville. ML: Offered to reach out to Matt Shellhorn to gauge interest.

4.2.7. The EWG agreed that financial incentives should be offered for installing workplace chargers for all commercial applications. PK: JEA is interested in providing such incentives and is currently exploring the details.

4.2.8. The EWG agreed that citing EVSE at multifamily residential developments is challenge and demonstration projects and changes to development policies may be useful to support the infrastructure. WR: In his experience. HOAs have been difficult to work with. Are there are plans for EVSE to be installed at Unity Plaza? BM: Could JEA and/or COJ offer expedited plan review of new developments or other incentives if it involves “EV ready” infrastructure. COJ plan review is currently very fast due to limited numbers of development proposals, but it could increase in the future. PK: Will explore the potential for plan review / other incentives as part of JEA’s review process.

4.3. Research & Planning

4.3.1. PK: Additional research and planning is required to understand how to best support EVs and EVSE in the region. JEA account executives can help identify interest among account holders. There is also need to solicit feedback from the region’s EV owners. The TPO’s April 8 event could be the foundation of such a group.

4.4. EV Support

4.4.1. PK: JEA is exploring the potential for incentives to car dealers to sell EVs. PK & WR: One barrier may be that dealers may not be equipped to sell the cars. Education and awareness to appropriately sell the vehicles could be required to support such an incentive. DD: Suggested identifying a dealers’ association meeting that the EWG could attend. PK: will work on finding out who to contact locally

4.4.2. The EWG agreed that the North Florida TPO should support procurement of EVs in public fleets. OUC has about 10 Nissan Leafs. COJ has two Chevy Volts and is tracking usage data. JEA is planning to add two vehicles shortly.

4.4.3. WR: Proposed an incentive for parking in the downtown core. For instance, EVs (or all Alternative Fuel Vehicles) could be exempt from parking fees within a specified zone. The North Florida TPO could administer a “sticker” program to identify these vehicles. Such zones could also exist in Five Points, Avondale, King Street, and San Marco. This would require the City of Jacksonville to participate (i.e. Jack Shad) and ultimately City Council approval.



Biofuels Working Group Meeting Minutes



Date: 28 Mar 2014
Project Name: North Florida Clean Fuels Coalition
Place: North Florida Transportation Planning Organization (North Florida TPO)
Time: 1:00 PM – 3:30 PM
Subject: Biofuels Working Group
Attendees: Wanda Forrest (WF), Ben Moore (BM); Dwayne van Lancker (DvL); Heather Cavanagh (HC); Ray Inman (RI)

1. WELCOME & INTRODUCTION

1.1. Attendees:

- 1.1.1. Wanda Forrest, Transportation Planning Manager, North Florida TPO, wforrest@northfloridatpo.com, (904) 306-7514.
- 1.1.2. Ben Moore, Energy & Sustainability Planner, RS&H, ben.moore@rsandh.com, (904) 256-2348
- 1.1.3. Dwayne Van Lancker, Private Citizen, dwaynev@coj.net, (904) 540-0512. DvL has built and operated a biofuels plant at the City of Jacksonville (COJ). He attended the meeting as a private citizen, rather than as a representative of COJ.
- 1.1.4. Heather Cavanagh, Cornerstone Environmental Group
- 1.1.5. Ray Inman, DSI Biodiesel/ St. Johns County, rinman@sjcfl.us. RI manages the biodiesel program at St. Johns County. He also owns DSI, which provides biodiesel production services.

1.2. Introduction

- 1.2.1. WF & BM: Described purpose of the meeting: 1) identify potential new stakeholders to participate in the Biofuels Working Group (BWG), 2) review and provide input on the North Florida Alternative Fuels, Vehicles and Infrastructure Plan (master plan), including the most accurate data possible on biofuels use in the region, and potential edits to the plan 3) identify projects for potential North Florida TPO funding, including potential market (or other) barriers, and 4) discuss the role of the BWG going forward.

2. POTENTIAL NEW MEMBERS

- 2.1. BM & WF: Asked attendees to identify potential new members of the Working Group. These could be invited to the follow up meeting, if one is held, and be included in the North Florida TPO's efforts on natural gas moving forward.
- 2.2. The following potential new members were identified by the Working Group:
 - 2.2.1. A representative from Clay County
 - 2.2.2. A representative from Duval County Public Schools (DCPS)
 - 2.2.3. A representative from the Jacksonville Transportation Authority (JTA)

3. ALTERNATIVE FUELS, VEHICLE AND INFRASTRUCTURE MASTER PLAN

- 3.1. The PWG began by discussing the sections of the master plan that deal with trends and the state of the North Florida region (3. Context, 3.2 Baseline, 3.3 Forecast, 8. Goals).



- 3.1.1. RI & DvL: COJ is not actually a biodiesel user as the master plan claims. First Coast Biofuels sells biodiesel to COJ for use by JEA only.
- 3.1.2. RI: St. Johns County is not included as a biodiesel user and should be added. RJ will supply accurate information on usage.
- 3.1.3. RI: Biodiesel (i.e. B20) is being retailed at Pilot Stations associated with Flying J Truck Stops in the master plan study region. Is it possible to determine how much? If so, include it in the master plan.
- 3.2. The PWG discussed the Infrastructure section of the master plan (6. Infrastructure)
 - 3.2.1. DvL: E85 is being sold at the City of Jacksonville's 44th Street location.
 - 3.2.2. RI: Biodiesel is being retailed at Pilot Stations at the B5 – B20 grades.
 - 3.2.3. RI: St. Johns County operates a private B20 station as part of its production facility.
- 3.3. The PWG discussed the Strategies section of the master plan (9. Strategies)
 - 3.3.1. RJ: Incentives for establishing biodiesel production (e.g. for the equipment cost) from secondary sources is not most important strategy for the North Florida TPO in this sector. About nine gallons per person per year of waste oil is produced.
 - 3.3.2. RJ: Education and Outreach to local government leaders is an important strategy that should be added to the master plan. However, about 60,000 of annual B20 demand (i.e. 20 percent of total diesel use or 300,000) is required to justify investment in infrastructure required to produce biodiesel from secondary sources. Only local government is well positioned for this kind of biodiesel production, however, only the largest local government / authorities have enough demand. These include JTA, JEA, COJ, Duval County Public Schools (DCPS), St. Johns County and potentially Clay County.
 - 3.3.3. DvL: COJ had its own biodiesel production facility. However, it was discontinued once Fleet Manager Sam Houston left the City. RJ: DSI Biodiesel proposed a public-private partnership with the City of Jacksonville that would have repowered the COJ biodiesel plant to produce 250,000 gpy. However, to date, the City has not expressed interest in pursuing the partnership.
 - 3.3.4. RI: St. Johns County and St. Johns County public schools are committed to fueling vehicles via CNG and does not have plans to expand its present use of biodiesel.
 - 3.3.5. WF & BM: JTA is currently working on converting a sizeable portion of its transit fleet to CNG, which may preclude use of biodiesel.
 - 3.3.6. DvL & RI: Waste oils could be collected from DCPS cafeterias and used as a feedstock supporting biodiesel production. School bus operators could be contractually obligated to utilize the fuel at a discount to diesel prices.
 - 3.3.7. RI: Commercial scale biodiesel production from primary sources is not likely a strategy that the North Florida TPO could have much influence over. Small commercial plants produce about 10 million gallons of biodiesel per year. Large plants produce from 50 to 100 million gpy. The feedstocks for production levels like these are primarily in the Midwest, using today's technology. This limits economical commercial scale production in Florida.

4. IDENTIFY POTENTIAL PROJECTS FOR IMPLEMENTATION



- 4.1.RI: Work with FDOT to add signage on highways that promotes availability of alternative fuels along the I-95 and I-10 corridors. Signage could be part of a campaign to brand North Florida’s interstates as an “Alternative Fuels Corridor.”
- 4.2.RI: Work with the COJ to restart its biodiesel production facility. Reference the proposal developed by DSI Biofuels in the master plan (See 3.3.3).
- 4.3.RI: Work with DCPS to develop a biodiesel production program (See 3.3.6).
- 4.4.RI: Work with local governments to develop incentives (e.g. tax abatement) for donating waste oil to producers.

Propane Working Group Meeting Minutes



Date: 9 May 2014
Project Name: North Florida Clean Fuels Coalition Planning
Place: North Florida Transportation Planning Organization (North Florida TPO)
Time: 9:00 AM – 11:30 AM
Subject: NFCFC Propane Working Group Meeting.
Attendees: Wanda Forrest (WF), Ben Moore (BM), Charles Brown (CB), Patrick McGrath (PM)

1. WELCOME & INTRODUCTION

1.1.Attendees:

- 1.1.1. Wanda Forrest, Transportation Planning Manager, North Florida TPO, wforrest@northfloridatpo.com, (904) 306-7514.
- 1.1.2. Ben Moore, Energy & Sustainability Planner, RS&H, ben.moore@rsandh.com, (904) 256-2348
- 1.1.3. Charles Brown, Ferrell Gas, (904) 237-2629
- 1.1.4. Patrick McGrath, Sawyer Gas, (904) 325-5604

1.2.Introduction

- 1.2.1. WF: Described purpose of the meeting: 1) identify projects for potentially North Florida TPO funding to projects, including potential market (or other) barriers, and 2) discuss the role of the Working Group going forward.

2. IDENTIFY POTENTIAL PROJECTS FOR IMPLEMENTATION

2.1.Upgrading Existing Private Dispensers to Public Stations

- 2.1.1. CB: Envisions an unstaffed public station with a card reader. The card would be a “fleet card,” i.e. not for individual use. The card could be used to establish a negotiated price between the dispenser and the individual fleet.
- 2.1.2. PM: A “grant” program or other incentive could be established for owners of existing propane dispensers to install a card reader and make their dispenser public. Criteria could be established to ensure the project meets specified goals.
- 2.1.3. CB: Suburban Propane currently markets propane via local UHaul Stations and installs dispensing equipment. They are a potential partner.
- 2.1.4. PM: Estimates that it would cost approximately \$20 - \$30K to upgrade an existing dispenser to operate with a card reader.

- 2.1.5. PM: Has been discussing the private-to-public existing dispenser concept with two current dispensing customers and there is interest.
- 2.2. Existing Network of Dispensers
 - 2.2.1. BM: The current network as understood by those interested in promoting alternative fuels (e.g. the Alternative Fuels Data Center station locator: <http://www.afdc.energy.gov/locator/stations/>) does not appear to adequately represent the opportunity for fueling locally or to upgrade dispensers for public fleet use.
 - 2.2.2. PM: Agreed. Amerigas provides access to its dispenser network via the web (<http://www.amerigas.com/find-amerigas-propane-locations/index.php>). Acknowledging that this site only has Amerigas-owned locations, it still represents several stations that are not in the AFDC database.
- 2.3. Key Sectors for Early Adoption of Propane Autogas
 - 2.3.1. CB: It is important to get government on board with using Autogas. Potential entities include Clay County, Nassau County, which may have fleet sizes and compositions that fit well with Autogas. An existing 30,000 gallon propane tank is located at COJ's Commonwealth Avenue fleet management center. It is not currently being used to fuel vehicles.
 - 2.3.2. CB: School buses are another good application. Bluebird is a leading manufacturer of Autogas school buses.
 - 2.3.3. PM: It is reasonable to expect \$1 / gallon savings relative to gasoline / diesel by switching to Autogas, given adequate demand. This includes overhead and profit for the fuel provider.
 - 2.3.4. PM: The commercial sector is also important, e.g. trades (plumbing, HVAC, etc.).
3. NEXT STEPS
 - 3.1. Propane Autogas Awareness Event
 - 3.1.1. The group discussed holding two events, one focused on the commercial sector, the other on the public / school bus sector, with the commercial sector the priority.
 - 3.1.2. The group envisioned holding a "happy hour" event, potentially at the Veolia fueling location near the Airport.
 - 3.1.3. The event could be held during the first quarter of the North Florida TPOs fiscal year (e.g. summer 2014). Autogas vehicles could be on display, along with the fueling station, which Veolia may be interested in opening to the public, given adequate demand. Speakers could include Checker Cab (which operates several Autogas vehicles), Roush (which manufactures Autogas vehicles), and Villages Airport Vans (which do vehicle conversions and maintenance) and Dale Calhoun of the Florida Propane Gas Association, which administers an incentive program for conversion of commercial mowers.
 - 3.1.4. A future event could focus on school bus fleets.



Electric Working Group Meeting Minutes



Date: 9 May 2014
Project Name: North Florida Clean Fuels Coalition Planning
Place: North Florida Transportation Planning Organization (North Florida TPO)
Time: 9:00 AM – 11:00 AM
Subject: NFCFC Coalition Meetings.
Attendees: Jeff Sheffield (JSf), Wanda Forrest (WF), Ben Moore (BM); David Dunkley (DD); Will Rigsby (WR); Peter King (PK), Dan Copeland (DC), Tom Larson (TL), Jack Shad (JSa), James Richardson (JR), Keith Brown (KB)

1. WELCOME & INTRODUCTION

1.1. Attendees:

- 1.1.1. Jeff Sheffield, Executive Director, North Florida TPO, jsheffield@northfloridatpo.com, (904) 306-7512
- 1.1.2. Wanda Forrest, Transportation Planning Manager, North Florida TPO, wforrest@northfloridatpo.com, (904) 306-7514.
- 1.1.3. Ben Moore, Energy & Sustainability Planner, RS&H, ben.moore@rsandh.com, (904) 256-2348
- 1.1.4. David Dunkley, Planner & Environmental Coordinator, JAA, david.dunkley@flyjacksonville.com, (904) 741-2744
- 1.1.5. Will Rigsby, Director of Channels and Technical Relations, NovaCharge, willrigsby@novacharge.net, (404) 229-3606
- 1.1.6. Peter King, Customer Solutions, JEA, kingpl@jea.com, (904) 630-8871
- 1.1.7. Dan Copeland, JEA, copedede@jea.com, (904) 665-8956
- 1.1.8. Tom Larson, Energy Advisor, energy@tomlarson.us, (904) 710-5538
- 1.1.9. Jack Shad, Public Parking Officer, COJ, jshad@coj.net, (904) 630-4990
- 1.1.10. James Richardson, Administrator, COJ-EPB, jrichard@coj.net, (904) 255-7213
- 1.1.11. Keith Brown, Joint Use Development Officer / Head of Real Estate, JTA, jkbrown@jtafla.com, (904) 630-3181

1.2. Introduction

- 1.2.1. WF: Described the meeting purpose: 1) identify projects for potential North Florida TPO funding to projects, including potential market (or other) barriers, and 2) discuss the role of the Working Group going forward.

2. IDENTIFY POTENTIAL PROJECTS FOR IMPLEMENTATION

2.1. Regional Electric Vehicle Charging Equipment (EVSE) Deployment

- 2.1.1. JSf: The North Florida TPO is budgeting approximately \$1.15M for alternative fuels in the coming fiscal year (July 2014 – June 2015). Approximately \$0.375M is allocated to Florida East Coast Railways to assist with converting four locomotives. Ultimately FEC plans to convert 24 locomotives, an investment of approximately \$50M. Approximately \$0.3M may be allocated for EVSE deployed in Duval, St. Johns, Clay and Nassau Counties. At a

conservatively estimated \$10K / EVSE approximately 30 – 35 EVSE may be deployed. Preliminary meetings with JEA indicate that a partnership between the North Florida TPO and JEA may be feasible under which the North Florida TPO would supply capital for deployment EVSE and JEA would provide operations and maintenance. Deployment would likely be phased over a multi-year period (e.g. 10-15 EVSE / year).

- 2.1.2. WR: Orlando is currently the state leader in deploying of EVSE. Its first station was installed in June 2010. Initially EVSE use in Orlando was minimal but it has ramped up rapidly with approximately 200 charging events now occurring per month.
- 2.1.3. PK: Orlando has identified some key point to consider with EVSE deployment, including obtaining easement agreements to locate EVSE, repair and maintenance, pricing (e.g. Orlando typically charges the retail rate for electricity with no markup, approximately \$0.13/kWh), use of alternative pricing, fuel cards, etc. Optimal siting of stations is also a consideration. JEA views workplace charging as a high priority for locating EVSE.
- 2.1.4. WR: All EVSE deployed to date in Orlando are available to the public on a 24/7 basis.
- 2.1.5. JSf: CMAO funding requires public accessibility. However, investments that result in emissions reduction are considered a public investment even if dollars are allocated to a private entity for ostensibly private use (e.g. the FEC project). In the case of EVSE deployment, the first several locations should be sited and promoted so as to be extremely successful in terms of utilization and public perception. If that means siting EVSE at workplaces, that would be desirable.
- 2.1.6. JSa: COJ City Council has been very receptive of COJ project to install EVSE in the Water Street Garage. COJ has used Energy Efficiency Conservation Block Grant funding to install EVSE, while attracting CSX's participation in the project. CSX will also install EVSE in the Water Street Garage. In this way, private funding may be leveraged to expand the impact of the North Florida TPO's efforts.
- 2.1.7. PK: This initiative could help "put Jacksonville on the map" for manufacturers of electric vehicles (EV). Currently manufacturers are concentrating marketing and sales efforts where consumer demand is highest. This project could help make Jacksonville a more attractive place for manufacturers to invest their resources.
- 2.1.8. TL: Libraries may be a good location for EVSE. In addition, signage is important. It should be visible on major routes, interstates, etc. indicating where EVSE is available. Tom is working to develop contacts with FDOT and COJ Traffic Department to investigate what is involved in developing signage standards, etc. California has a manual for EVSE signage.
- 2.1.9. KB: It will be important to work closely with the Downtown Development Review Board to ensure that EVSE is welcomed and encouraged.

3. NEXT STEPS

3.1. Electric Vehicles



- 3.1.1. JSa: COJ is investigating procurement of additional EVs. It currently has two Volts, which charge via standard 120 Volt services (e.g. no EVSE). Incentives could help fleets adopt vehicles more rapidly.
- 3.1.2. JSf: The first phase of the North Florida TPOs efforts is focused on EVSE. Later phases may involve incentivizing fleets to procure EVs.
- 3.2. Siting of EVSE
 - 3.2.1. KB: It is important to view EVSE in the larger context of providing mobility options to travelers, e.g. bike-share, busses, car sharing, and EVs. JTA has properties across the city where it is exploring providing and integrating such options. For location of EVSE, it would be useful to understand the typical customer profile overlaid upon projections for regional growth.
 - 3.2.2. JSf: Could we obtain information on Orlando's top 15 charging locations? Based on such information the group could develop methods for siting EVSE.