



Alternative Fuel Vehicles & the NJTPA Region

About the NJTPA

THE NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY (NJTPA) is the federally authorized Metropolitan Planning Organization for 6.6 million people in the 13-county northern New Jersey region. Each year, the NJTPA oversees the investment of more than \$1 billion in federal funding for transportation projects and provides a forum for interagency cooperation and public input into funding decisions. It also sponsors and conducts studies, assists county planning agencies and monitors compliance with national air quality goals.

The NJTPA Board of Trustees includes 15 local elected officials, including one representative from each of the 13 northern New Jersey counties—Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union and Warren—as well as from the cities of Newark and Jersey City. The Board also includes the Commissioner of the New Jersey Department of Transportation (NJDOT), the Executive Director of NJ TRANSIT, the Chairman of the Port Authority of New York & New Jersey and a Citizens' Representative appointed by the Governor.

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About this Brochure

This publication presents a summary of alternative fuel vehicles (AFVs) and discusses the work of the NJTPA to promote AFV readiness in the region. National attention to AFVs has grown dramatically in recent years, largely because of their potential health, environmental and economic benefits. AFVs can reduce air pollution, greenhouse gas emissions and dependence on imported oil. Future generations depend on the decisions made today and AFVs promise to help build a more sustainable region and economy.



NJTPA and Alternative Fuel Vehicles

The NJTPA's Regional Transportation Plan calls for protecting the environment and reducing transportation emissions. Facilitating the marketplace for AFV adoption speaks directly to these goals.

In 2013, the NJTPA participated in the Regional Electric Vehicle Network, an 11-state consortium spanning from Vermont to Washington, DC. The Network received a grant from the U.S. Department of Energy to investigate the infrastructure needed to promote and support natural gas, biofuel and electric vehicles in the Northeast and Mid-Atlantic states. This effort analyzed the challenges to implementing electric vehicles and provided model guidelines for zoning, siting, and other policies necessary for electric vehicle infrastructure in the 11-state region.

To advance this work, the NJTPA hosted "Plug It In: Advancing Electric Vehicle Adoption in New Jersey," a public symposium held in December 2013. It featured a panel of experts on EVs. Much of their knowledge and experience is shared in this brochure.

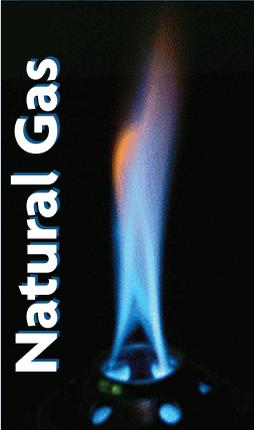
The NJTPA is now developing a study of local AFV readiness planning for our region and will work with three pilot municipalities. Preparing such readiness plans by localities has picked up speed across the country. The study will:

- ◆ Examine regulations affecting the advancement of AFVs, explore ways to facilitate the use of these vehicles and their related infrastructure, and develop an AFV readiness plan for each of the pilot municipalities.
- ◆ Develop a handbook of best practices to inform, educate and guide others in pursuing AFV readiness planning for their town or county.

These activities will help advance the objectives of the State of New Jersey's Global Warming Response Act, which mandates statewide greenhouse gas emissions reductions through 2050.



What Are Alternative Fuel Vehicles?

FUEL	DESCRIPTION	BENEFITS	CHALLENGES
 <p>Electric</p>	<p>All-electric vehicles (AEVs) such as Nissan Leaf and Tesla models, operate completely on battery power charged from the electrical grid.</p> <p>Hybrid electric vehicles (HEVs) such as the Prius have small internal combustion engines and an electric motor.</p> <p>Plug-in hybrid electric vehicles (PHEVs) such as Chevy Volt can be charged from the grid.</p>	<p>Compared with conventional vehicles:</p> <ul style="list-style-type: none"> ◆ Lower GHG emissions, especially in regions that use low-polluting energy sources for electricity generation. ◆ No tailpipe emissions (AEVs). ◆ Better fuel economy. ◆ Inexpensive to operate/maintain. ◆ Increased domestic energy security. ◆ More fueling flexibility (hybrid vehicles). 	<p>Compared with conventional vehicles:</p> <ul style="list-style-type: none"> ◆ Short driving range. ◆ Long recharging time. ◆ Expensive batteries/vehicles. ◆ Battery space. ◆ Lack of available charging stations. ◆ Training needed for first responders.
 <p>Natural Gas</p>	<p>Well-suited to power heavy-duty trucks and buses. Used for trucks, transit buses, taxi fleets, and school buses.</p> <p>The two main types of natural gas used in transportation are compressed natural gas (CNG) and liquefied natural gas (LNG).</p> <p>Examples: CNG versions of the Honda Civic, Chevrolet Silverado 2500, Dodge Ram 2500 CNG and Ford F-250 pickups.</p>	<ul style="list-style-type: none"> ◆ Advantageous for high-mileage, centrally fueled fleets that operate within a limited area. ◆ Costs about 20-60% less than petroleum fuels on an energy equivalent basis; vehicles run 25 percent cleaner. ◆ Available domestically and has widespread distribution infrastructure in place. ◆ LNG suitable for traveling long distances. ◆ Since LNG occupies only a fraction of the volume of CNG, it is more economical to transport and store. 	<ul style="list-style-type: none"> ◆ Incorporating high-pressure storage tanks into vehicle designs without taking up too much space is difficult. ◆ Fuel tanks are also heavier than gasoline tanks. ◆ Lack of available refueling stations.
 <p>Ethanol</p>	<p>Renewable, domestically produced, alcohol fuel made from plant material. E85 can be used in flexible fuel vehicles (FFVs).</p>	<ul style="list-style-type: none"> ◆ A specific blend, E85, produces lower emissions of some pollutants than conventional vehicles. ◆ Can be distributed at existing gas stations. ◆ Lower GHG emissions and reductions of some toxins. 	<ul style="list-style-type: none"> ◆ E85 can only be used in flexible fuel vehicles. ◆ Limited availability. ◆ Lower fuel economy. ◆ Difficult to transport.

ALTERNATIVE FUEL VEHICLES use combinations of various types of fuels and technologies to reduce the use of petroleum in on-road vehicles. The most common AFVs driven today are electric vehicles (EVs) and natural gas vehicles (NGVs).

FUEL	DESCRIPTION	BENEFITS	CHALLENGES
 <p>Biodiesel</p>	<p>Biodiesel is a form of diesel fuel manufactured from vegetable oils, animal fats, or recycled restaurant oils. It is often available as a blend with petroleum diesel.</p>	<ul style="list-style-type: none"> ◆ Can be used in most diesel engines. ◆ Less pollutants and GHG emissions than petroleum-based diesel. ◆ Biodegradable. ◆ Non-toxic. ◆ Safer to handle. 	<ul style="list-style-type: none"> ◆ Slightly lower power and fuel economy. ◆ Currently more expensive than petroleum diesel.
 <p>Propane</p>	<p>Propane, or liquefied petroleum gas (LPG), is a clean-burning fossil fuel that can be used to power internal combustion engines.</p>	<ul style="list-style-type: none"> ◆ Usually less expensive than gasoline. ◆ Can be used without degrading vehicle performance. ◆ Potentially lower CO₂, CO, and hydrocarbon. ◆ Most LPG used in the U.S. comes from domestic sources. 	<ul style="list-style-type: none"> ◆ Lower fuel economy. ◆ Less readily available than gasoline and diesel. ◆ Limited availability for vehicles currently on the market.
 <p>Hydrogen</p>	<p>Hydrogen is being explored as a fuel for passenger vehicles.</p> <p>It can be used in fuel cells to power electric motors or burned in internal combustion engines.</p>	<ul style="list-style-type: none"> ◆ Produces no pollutants or greenhouse gases when used in fuel cell vehicles. ◆ Can be produced domestically from several sources such as biomass or electrolysis of water. 	<ul style="list-style-type: none"> ◆ Releases NO_x when burned in internal combustion engines. ◆ Stations currently only available at a few locations, mostly in California. ◆ More expensive than conventional vehicles. ◆ Not yet available for sale to public. ◆ Tank requires more frequent refills compared to conventional vehicles.

Alternative Fuel Vehicles in the Region

There are more than 75 stations offering alternative fuels in the NJTPA region. Electric and CNG fueling stations are concentrated in Essex County, with some additional clusters of electric fueling stations in Monmouth, Ocean and Middlesex counties and others spread throughout the region. Over 100 EVs are registered in Monmouth County and nearly 100 in Bergen County. In New Jersey, electric vehicles are the cleanest option as nuclear energy generates more than 50% of the State's electricity, with zero carbon emissions at the plant site.

The table below demonstrates how different types of AFVs are distributed in the region. Overall, nearly half of the region's AFVs are PHEVs.

Distribution of Regional Alternative Fuel Vehicle Purchases in the Region (as of 2011)

COUNTY	CNG	ELECTRIC	PHEV	COUNTY TOTAL
Bergen	7	40	58	105
Essex	86	14	50	150
Hudson	8	3	7	18
Hunterdon	1	6	9	16
Middlesex	13	12	44	69
Monmouth	6	68	37	111
Morris	21	24	41	86
Ocean	4	16	24	44
Passaic	2	14	23	39
Somerset	1	21	20	42
Sussex	1	1	10	12
Union	6	10	10	26
Warren	0	2	4	6
Region	156	231	337	724

Source: New Jersey Department of Environmental Protection (2012)

Advancing Alternative Fuel Vehicles in New Jersey

In recent years, New Jersey has taken steps to encourage the increased use of AFVs, in particular EVs and NGVs. This includes:

- ◆ Streamlining permits for most charging stations
- ◆ Providing a sales tax exemption for battery-powered or fuel cell-powered zero emission vehicles.
- ◆ Allowing government agencies at all levels to purchase EVs through the State Motor Vehicles Purchasing Contract.
- ◆ Including a goal in the State Energy Plan to increase the number of natural gas truck, bus and vehicle engines.

Next Steps

The NJTPA will be assisting in preparing action plans to facilitate municipal AVF readiness over the next few years. Typically, AFV readiness plans make recommendations to spur market penetration; assess town regulations that affect the advancement of AFV infrastructure; identify possible suitable locations for infrastructure; review parking ordinances; review permitting requirements and inspection processes within building departments; conduct outreach to stakeholders and potential consumers; develop guidance in addressing emergency response for AFVs; and provide recommendations for mechanical certification in the maintenance of AFVs.

NJTPA is collaborating with Sustainable Jersey, a nonprofit which administers a certification program for municipalities in New Jersey that want to “go green,” on the development of an “action item” of recommended measures to facilitate the adoption of electric vehicles. Once the action item is approved, the organizations can provide tools, training or other types of support to communities as they pursue this action. Completion of this activity will help a community towards earning a certification through Sustainable Jersey.

The Sustainable Business Initiative of NJDEP will incorporate the topic of AFVs in their mission to raise awareness, educate and motivate companies to pursue sustainability as a competitive business strategy and a shared community responsibility. Working with the NJTPA and other New Jersey stakeholders, the program will incorporate AFVs in their strategy, in efforts to expand workplace charging and support employer and employee incentives for the adoption of AFVs.

The NJTPA, with the other stakeholders of Together North Jersey—a consortium of public, private and non-profit groups developing a Regional Plan for Sustainable Development—seeks to support and facilitate the adoption of municipal, county and state actions to advance AFVs across the region. Actions range widely from establishing fleet procedures that enable the full range of AFVs to compete for government contracts, to developing permit and zoning procedures and/or ordinances and codes that ensure timely approval of fast charge installations for electric vehicles.





NJTPA NORTH JERSEY
TRANSPORTATION
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Defining the Vision. Shaping the Future.

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