DOI: 10.17117/na.2015.09.769

Поступила (Received): 29.09.2015

<http://ucom.ru/doc/na.2015.09.769.pdf>

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Транспорт на альтернативном топливе:
проблемы и перспективы

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Alternative fuel vehicles: problems and prospects

В данной статье рассмотрена целесообразность использования различных видов альтернативного моторного топлива. Это водород, этанол, метанол, биогаз и др. Приведены отличительные особенности альтернативных видов топлива. Определены проблемы их использования в автомобильном транспорте. Проанализированы преимущества и недостатки каждого вида топлива

Ключевые слова: альтернативное топливо, транспортное средство, биодизель, гибрид, этанол

This article examines the feasibility of using the different types of alternative motor fuels. They are hydrogen, ethanol, methanol, biogas, and others. The distinctive features of alternative fuels are summarized. The problems of their use in road transport are identified. The advantages and disadvantages of each type of fuel are analyzed

Key words: alternative fuel, vehicle, biodiesel, hybrid, ethanol

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In efforts to scale down on petroleum usage and dependency and to reduce greenhouse gas emissions, many non-petroleum-based alternative fuels are now being used to power vehicles. This includes biodiesel, electricity, ethanol, natural gas, and propane. Compressed hydrogen gas is currently only being used in heavy-duty vehicles, which are not available to consumers. In addition to releasing less air pollutants into the environment, many consumers are switching to alternative fuel vehicles to save money [1]. Many alternative fuels are less expensive than gasoline on an energy-equivalent basis and/or a per-gallon basis. Advancements in technology, availability of fuel, and growing popularity are leading to more and more alternative fuel vehicles being manufactured and put on the market. This article will breakdown

the various types of alternative fuels, where to find them, and the vehicles you can choose from for each type of fuel.

Biodiesel is a renewable fuel source that can be manufactured from a variety of products, including animal fats, vegetable oils, and even recycled cooking grease from restaurants. However, these products should be converted into biodiesel before being used to fuel your vehicle. Using them in their raw, unprocessed form can lead to long-term engine deposits, operational and maintenance problems, and reduce the overall life of your engine [2]. Once the products are processed and converted, the result is a nontoxic, biodegradable, clean-burning fuel that is much safer to handle than petroleum-based fuel. In addition to pure biodiesel fuel (B100), there are biodiesel-petroleum diesel blends. Common blends include 2% biodiesel (B2), 5% biodiesel (B5), and the most common, 20% biodiesel (B20). Many diesel engines can handle B20 without any modifications being made to the vehicle. However, using it may void your vehicle warranty, so check before you fill your tank with biodiesel.

Eight light-duty biodiesel (B20) vehicles are currently available to consumers. All of these are either pickup trucks or vans manufactured by Chevrolet, Ford, GMC, and Ram.

There are currently 696 biodiesel stations which can be searched for by address, ZIP, or state. The price of B20 biodiesel tends to be slightly more expensive than petroleum diesel and causes vehicles to have somewhat lower fuel economy and power, but biodiesel is better for the environment and safer to handle.

Vehicles harnessing electricity as an alternative fuel source have an electric motor fueled by a battery. This motor will either be the sole source of power for the vehicle or be used in combination with an internal combustion engine running on petroleum or an alternative fuel. There are three types of electric vehicles: all-electric, hybrids, and plug-in hybrids.

All-electric vehicles are powered solely by a battery-powered electric motor, which means they produce no exhaust or emissions. These vehicles must be charged by plugging into an electric power source, and they have a range averaging 100 miles per charge. Numerous factors can affect the range, including temperature, speed, acceleration, and strain on the engine caused by weight, road conditions, and road incline.

Hybrid and plug-in hybrid vehicles contain both an electric motor and an internal combustion engine. Vehicle power and performance is shared between the motor and the engine, producing fewer emissions and requiring less fuel, which save you money at the pump. The difference between these two vehicles is that plug-in hybrids must be plugged in to charge the battery for the electric motor, while hybrids use the engine to charge the battery.

In the USA, for example, there are currently close to 6,800 electric stations. You also have the option of having a charging port installed in your home, but you will have to pay an installation fee and the cost of charging your vehicle will increase your electric bill.

If you are interested in an electric vehicle, you have several makes and models to choose from for each type. There are currently 11 fully-electric vehicles, 37 hy-

brids, and four plug-in hybrids being manufactured. These include sedans, SUVs, and pickup trucks by Chevrolet, Nissan, Ford, BMW, Acura, Honda, and many more.

Ethanol is a renewable fuel made from plant materials, primarily starch in corn grain. A small amount of ethanol can be found in 95% of the gasoline being produced in the USA. To cut down on the nation's use of petroleum, a high-level ethanol blend (E85) is being produced. E85 contains anywhere from 51% to 83% ethanol blended with gasoline. Seasonal conditions and geographic locations affect the performance of ethanol fuels, which is why there is such a range in the ethanol percentage in E85.

Ethanol is a high-octane fuel, so it will increase your vehicle's power and performance. It contains less energy than gasoline, so you will have lower fuel economy. Also, since ethanol is a corn-based product, air pollutants and greenhouse gas emissions are significantly less than gasoline. Ethanol is typically slightly less expensive than gasoline, and there are nearly 2,600 ethanol stations in the country.

It lists 84 models of E85 vehicles currently available to consumers. You can choose from pickup trucks, sedans, vans, and SUVs from a wide range of auto makers, including Dodge, Audi, Cadillac, Toyota, Mercedes-Benz, Volkswagen, and even Bentley Motors.

Natural gas fuel is a mixture of hydrocarbons, mostly methane. It's odorless, nontoxic, and clean-burning. Natural gas as an alternative fuel comes in two forms: liquefied (LNG) and compressed (CNG). LNG is more expensive and is currently only used in heavy-duty vehicles not available to consumers. CNG vehicles are equipped with tanks that store natural gas at a pressure ranging from 3,000 to 3,600 pounds per square inch.

Natural gas is similar to gasoline when it comes to power and performance, but the fuel economy of natural gas is lower because it contains less overall energy than gasoline. CNG vehicles produce lower levels of exhaust emissions and no evaporative emissions, since the gas is stored in a tank that is completely sealed. CNG is significantly less expensive than gasoline and other alternative fuels when compared on an energy-equivalent basis. There are close to 1,200 CNG stations in the USA nowadays.

Some vehicles are dedicated natural gas vehicles, which means, they are designed to run only on natural gas. The Department shows there are four types of dedicated natural gas vehicles available to consumers. Bi-fuel natural gas vehicles have natural gas and gasoline fueling systems, allowing them to run on either. There are currently seven bi-fuel natural gas vehicles on the market.

Propane is liquefied petroleum gas. It's a high-energy, high-octane, non-toxic alternative to gasoline, and is typically less expensive. Propane is clean burning, so it increases the service life of your engine, reducing maintenance costs. The power, performance, and range of a propane-powered vehicle is similar to gasoline-powered vehicles. Propane is now the third most common engine fuel in the world. There are currently 2,776 propane stations in the U.S.

Propane-powered vehicles have an onboard tank pressurized to around 150 pounds per square inch. The size and capacity of the tank will vary depending on the vehicle, much like the size of gas tanks vary in conventional vehicles. There are dedicated propane vehicles that rely solely on propane, and there are bi-fuel propane vehicles that have propane and gasoline fuel systems, allowing the vehicle to be pow-

ered by either type of fuel. But there only two dedicated propane vehicles and four bi-fuel propane vehicles currently available to consumers.

Список используемых источников:

1. Емельянов В. Е. Альтернативные экологически чистые виды топлива для автомобилей. Свойства, разновидности, применение. М.: АСТ-Астрель, 2004. 128 с.
2. Иванникова Е.М., Систер В.Г., Нагорнов С.А. Альтернативные топлива для дизельных двигателей. М: 2014. 185 с.
3. URL: <http://alternativenergy.ru/energiya/953-vidy-alternativnogo-topliva.html>

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