

Flex Fuel – Reducing Gasoline Dependency and Carbon Footprints

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Flex-fuel has gained popularity recently as an alternative, environmentally friendly fuel for our cars. Flex-fuel employs a blend of ethanol that emits fewer pollutants and is obtained responsibly, making it a more environmentally friendly fuel. Flex-fuel is a step forward on the path toward transitioning India's automobile population to a more environmentally friendly fuel source. Although the cost of Electric vehicle introduction in India is still too steep for widespread acceptance, flex-fuel offers a practical means of being more environmentally conscious. Nitin Gadkari, the Union Minister for Road Transport and Highways, has emphasized the need for automakers to create flex-fuel compliant engines for their next models. Flex-fuel seems to be a practical substitute fuel to counter growing fuel prices while offering a more environmentally friendly fuel to bridge the gap until the changeover to full electrification in the future.

Flex-Fuel: Next generation alternative for petrol

Flex-fuel is a substitute for petrol that is made by combining either methanol or ethanol with regular petrol. The engine uses this mixed fuel mixture that is stored in a single fuel tank. Contrarily, CNG fuel systems store petrol and compressed natural gas (CNG) for the engine, respectively, in separate tanks. Any combination from 100% petrol to 100% ethanol to anything in between can be used as the ethanol to petrol ratio. Flex-fuel cars, as opposed to CNG vehicles, only require modest modifications to the engine and fuel system in order to use the fuel. Therefore, flex-fuel compatibility must be built-in from the start and cannot be introduced afterwards.

The fuel system and engine have been modified to make them resistant to corrosion by ethanol because it can easily degrade engines. This gasoline usage may quickly become popular across the populace because customers' driving habits won't be greatly changed.



An internal combustion engine (ICE) powers a flex fuel vehicle, however unlike a standard petrol or diesel automobile, this engine can operate on many fuel types or even a blend of fuels. These engines may, however, also be used to run entirely on ethanol or petrol. The most widely used models use a blend of ethanol or methanol and petrol. The addition of a fuel mix sensor and programming in the engine control module (ECM) that detects and automatically adjusts for any fuel ratio permitted, make this feasible.

According to IHS Markit, there were over 21 million flex fuel cars on American roads as of 2018. Brazil, however, is the largest market and the industry leader. The primary differences between flex fuel vehicles and normal gasoline-only vehicles are an ethanol-compatible fuel system and updated engine calibration. The most important benefit of using ethanol in blends is the dramatic decrease in harmful pollutants such carbon monoxide, sulphur, carbon, and nitrogen oxides. Another clear benefit of blending is the decrease in oil imports for use in refuelling cars.

There are disadvantages, though. A flex fuel vehicle typically faces a modest decrease in fuel efficiency, ranging from 4% to 8%, while utilising ethanol as fuel. Due to the usage of gasoline-optimized engines, greater ethanol levels frequently result in decreased fuel efficiency; yet, many flex fuel cars have improved acceleration when utilising higher ethanol mixtures.

This presents a big challenge for ethanol blending since plants like sugarcane frequently need a lot of water to develop. An estimate from NITI Aayog states that in 2019–20, sugarcane alone accounted for more than 90% of the nation's ethanol output. There is also a belief that the need for ethanol/methanol blending has political undertones because sugarcane is a politically significant crop in places like Maharashtra and Uttar Pradesh.

Approximately 9.5 percent of the fuel distributed at petrol pumps in major cities now contains ethanol, and it is estimated that the mandatory 10 percent ethanol blending will be completed by November 2022. But considering that the government's 2018 National Biofuel Policy includes a 2025 goal of mixing 20% ethanol into petrol, this is anticipated to rise dramatically.

A key advantage from a global perspective is that countries with the flexibility to vary the mix's proportion in reaction to fluctuations in crude oil prices, such as Brazil did shortly



after the Ukraine War, are cited. The precondition is that different levels of adaptation to this fuel mix have been given for the fleet of cars.

Petrobras, the state-owned oil company in Brazil, is required to buy ethanol and mix the fuel at retail pumps, which means that almost all automobiles in the nation must be equipped to handle fuel mixtures containing at least 22% ethanol.

In the majority of Brazilian cities, therefore, there are very few light cars that run only on petrol. The government has also given a subsidy to narrow the price difference between higher ethanol mixtures to help the notion become more practical. It is an extra element that would need to be considered when India accelerates its fuel blending strategy.

Why is the Indian government promoting FFVs?

In FY21, India imported oil worth \$62.7 billion, a sum that was equaled in just the first seven months (April to October) of this year. The situation is made worse by the rupee, which is at its lowest level in the previous three fiscal years. The government is feverishly attempting to lower the price of imported oil through the development of fuel alternatives including ethanol, hydrogen, and electricity. Calculations show that even a push to the E20 level might result in savings of \$4 billion yearly. For this to be practical, flex-fuel cars must be made accessible on the market. Additionally, FFVs will help the government keep its promises to reduce pollution.

How much will FFVs contribute to reducing emissions?

According to a research by the expert group assembled by the Ministry of Petroleum and Natural Gas, carbon monoxide emissions were determined to be 50% lower in two-wheelers and 30% lower in four-wheelers by just pressing E20 (Ethanol) as opposed to petrol. Hydrocarbon levels dropped by 20%, it was discovered. According to the analysis, 4 wheelers that were designed for E0 and calibrated for E10 will lose around 6-7% of their fuel efficiency when E20 is added.

What has been the auto industry's reaction to government's policy?

Vehicle prices will rise as a result of higher production costs brought on by increased ethanol mixing. Some auto parts must be swapped out for appropriate ones in order to prevent corrosion, especially those that are exposed to higher ethanol concentrations. According to the car industry, ethanol mix requirements for E20 are anticipated to be put into place by 2025. Government authorities claim that companies like Toyota, Maruti Suzuki, and Hyundai have agreed to construct the FFV in India. Apparently, Bajaj Auto and TVS Motor Company have also given the government their word that they will release three-wheelers that can only operate on ethanol.

Benefits of the Flex-Fuel

Cleaner Fuel

Flex-fuel incorporates ethanol in addition to petrol, making it burn cleaner than pure petrol or diesel. This is so because ethanol emits less hazardous gases and particles and burns cleaner than other fuels. Flex-fuel thus becomes a more eco-friendly fuel that will help reduce pollution in many of India's dirty towns.

Adaptable Use

Flex-fuel engines may run on any ethanol-petrol combination. This suggests that you are not constrained to utilizing a specific fuel, like CNG, and may instead use any readily available fuel, even pure petrol. Pure petrol may be used for motoring on highways or in rural areas, whereas flex fuel allows for the use of a high mix in urban areas. The car's sensors are designed to recognize the fuel mix and adjust how the gasoline is used as needed.

Sustainable Source

Ethanol and methanol are cleaner fuels since they are made from food crops like sugar cane and maize. This decreases the cost of the gasoline as a whole as well as the carbon footprint related to fuel processing.

Similar Performance

It is common knowledge that vehicles running on CNG have less power than those running on petrol. The performance of flex-fuel cars is equivalent to and oftentimes even better than that of pure petrol vehicles since they still contain some petrol, which prevents this from happening.

Drawbacks of Nationwide of Adoption of Flex-Fuel

The largest barrier to the widespread use of flex-fuel cars is the cost of the necessary infrastructure. Because existing engines won't be completely compatible with flex-fuels, fuel stations will need to offer the infrastructure needed to support both pure petrol and flex-fuel cars. Since they won't buy a flex-fuel vehicle until after they've either wrecked or sold their pure petrol vehicle, current automobile owners will take longer to make the move to the fuel. As a result, the rate of technological adoption is slowed.

Increased Engine Wear

The ethanol in flex fuel will subject the engines to extra wear and stress even if they are designed to adjust to the fuel mix. This might lead to higher maintenance costs in the interim while the technology matures and becomes more dependable.

Lower Mileage

Even though it burns cleaner, ethanol contains less energy than pure petrol. The fuel consumption of a flex-fuel car will be higher than that of a conventional petrol vehicle. The lower gasoline costs of flex-fuel, however, can help offset the cost of a lesser mileage. Flex-

fuel vehicles may become increasingly common in India despite their low mileage because to the country's low petrol prices.

When will we be able to operate a flex-fuel vehicle?

Models of flex-fuel vehicles are offered in Brazil and Sweden by automakers including Renault, Honda, Hyundai, Volvo, and Volkswagen. For example- Renault sells the Duster, a car with a flex-fuel engine, on the Swedish market. Volvo automobiles like the XC60 have flex-fuel engines as well for this market. It's noteworthy to notice that Honda offers the Honda City with a flex-fuel engine for sale in Brazil; when the rule is put into place in India, Honda is probably going to offer the same car.

A positive start towards transitioning India's automotive population to a more ecologically friendly fuel source is the debut of Flex- fuel. Although the cost of EV adoption in India is now prohibitive, flex-fuel offers a practical way to be more ecologically conscientious.

Conclusion

Flex fuel is a step in the right direction towards sustainable development that will improve the environment by lowering carbon footprints and reducing reliance on non-renewable resources.

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