**Blending methanol as fuel in automotive industries towards minimizing vehicular air pollution : Potentialities and prospects in Indian automotive industries**

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**Abstract**

Adding methanol into gasoline or diesel allows the fuel to have a complete combustion with the present of oxygen which increases its combustion efficiency and reduces greenhouse gas emission. In terms of application, Brazil has successfully and widely used methanol as a fuel for spark ignition engine operation. In the United States,10% methanol blended with gasoline known as gasohol is available at thousands of petrol service stations as an automobile fuel. Methanol has emerged up as a sustainable fuel for IC engines in past few decades due to its characteristics of soot free burning and higher efficiencies at less cost. The EU has set a 10% renewable energy requirement for the transport sector, to be complied with by 2020. In 2010, the use of renewable energy by the transport sector was 4.70%, 91% of which was covered by biofuels.

This paper discusses significance of methanol as a fuel for IC engines and its applicability in various sectors.

**Keywords:** Alcohol fuel, iso-butanol, high energy content, better fuel vaporization, higher blending octane, anhydrous ethanol blends.

**Introduction**

Alternative fuels on internal combustion engine (ICE) recently has become an attention due to the concern for environmental protection, and needs on reducing dependency on fossil fuels and meeting the current stringent regulation. Alcohol fuel is one of the attractive alternative fuels as it can be produced from renewable resources and is oxygenated. Methanol fuel is a well-known alcohol fuel that can be blended at the lower blending ratio with gasoline and produce better engine operation in spark ignition engine. However, there is a problem related to its methanol properties, especially on its energy content and vapour lock characteristics. Alcohol with higher carbon number such as iso-butanol has high energy content and is able to displace more petroleum gasoline compared to the methanol-gasoline blended fuel.

**Cost of production of methanol**

Since, India is producing all of its methanol from imported natural gas, it must use coal for methanol production which is expected to make it economically viable to produce methanol in India. India must set up a pilot plant for methanol production which would be followed by a commercial plant. As there is no commercial coal to methanol plant in India, it would be difficult to calculate the exact cost of per unit methanol production, though, there have been pretty fair estimates of the same as Coal to methanol technology is a proven technology across the World.

It is estimated that a 1600 tons per day of methanol plant will require a capital expenditure of ~INR 1200 Cr which would be able to produce methanol at INR 17-19 per liter which is comparable with the cost of imported methanol. Whereas, presently, the per liter cost of methanol production in India is INR 25-27 or even more depending on the volatility in the price of imported natural gas. Apart from using coal as a feedstock, biomass/municipal solid waste and flared natural gas can also be used for methanol production, but the continuous availability of latter would be a challenge. Therefore, coal seems to be a promising fuel for producing methanol in India. Since, Coal to methanol is a proven technology, India must tap its large coal reserves to produce methanol (and DME & Olefins) to use it as a substitute or drop-in fuel for gasoline and (diesel). Weak global coal prices and stricter environmental laws are likely to offer firm coal to methanol margins.

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**Figure: Value of Methanol Imports Vs Exports (INR Cr)**

**Technical modifications made for the RTR 200 to run on ethanol**

Ethanol is a renewable biofuel obtained by fermentation of crops such as sugarcane and corn. The E100 - stands for 'ethanol 100'. In other words it signifies that this Apache runs on 100 percent ethanol. Also it can run on E80 – a blend of 80 percent ethanol and 20 percent petrol – if pure ethanol is unavailable. These are the only two types of fuel that can power this bike and it cannot run on just regular petrol. Ethanol is also a non-toxic fuel with 35 percent oxygen content which helps reduce carbon monoxide emissions, particulate matter and sulphur dioxide. It is a far greener fuel than petrol, which makes it kinder on the environment. Few changes TVS had to make to ensure that the bike can run on ethanol. These include a twin port, twin-spray fuel-injection system and a few rubber and plastic bits also have been upgraded to specifications that can resist ethanol’s corrosive nature. This bike also gets just a single-channel ABS, against the dual-channel system that is available on the petrol models. The E100 can be used to run the engine with ambient temperatures of 15 degrees Celsius and above, and for cold regions, E80 (80 per cent ethanol mixture) is said to be more than enough for easy starting and smooth performance.

**Conclusions**

Ethanol is the main renewable fuel used for transportation in the U.S. Blending mandates exist in 52 countries around the world having such requirements. China has a biofuels mandate of 10% by 2020. India, expects to cover 20% of its fuel demand with methanol by 2018. Brazil, where ethanol has been used in different fuel blends since the mid-70s, mandates that 20% of the gasoline demand has to be supplied by ethanol by 2022. Renewable methanol by capturing CO2 back from the atmosphere is becoming very popular and is seen by the world as the enduring energy solution known to mankind. Methanol is a significant solution to the burning problem of urban pollution worldwide.

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