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COMPATIBILITY OF BIODIESEL IN VEHICLES IN INDONESIA

In January 2020, Indonesia started implementing 30% biodiesel blending (B30). This was an increase from the government target for 20% blending (B20), which began in 2016. There is also strong desire to continue increasing the blending mandate, and this raises a concern about the compatibility of blended fuels with vehicle components. A 2018 ICCT study that reviewed evidence of the impact of biodiesel on corrosion, degradation of parts, and the clogging of filters and fuel injectors in vehicles is thus highly relevant in the current context.

KEY FINDINGS

First, it is important to understand that compatibility concerns arise because biodiesel is different from conventional (fossil) diesel. Biodiesel absorbs more water from the air, is thicker in consistency, dissolves other materials more easily, is less stable, and is more easily damaged by light, temperature, and metals compared to conventional diesel. These properties lead to the following problems when using biodiesel in vehicles.

Corrosion. Biodiesel is more corrosive than conventional diesel because it absorbs water and dissolves materials. Water is corrosive by itself and its presence in a vehicle's fuel tank further allows the growth of micro-organisms that also contribute to corrosion. The higher solvency of biodiesel dissolves the paint and coatings on vehicle components, which exposes the metal underneath to the water in biodiesel and increases corrosion. These corrosive properties lead to a vicious cycle: When biodiesel corrodes metals, tiny particles of those metals are dissolved into the biodiesel, and that makes the mixture even more corrosive. Palm biodiesel in particular increases the corrosion of many metals and doubles the rate of corrosion in copper and aluminum compared to conventional diesel.

Wear. Biodiesel is more slippery than diesel, and this helps slow the wear of vehicle parts. But this only helps in the short term. Once the metals in vehicles dissolve into the biodiesel, the high corrosion causes vehicle parts to wear faster.

Broken seals. Biodiesel damages many of the stretchy rubbers and plastics that are used in vehicle components like seals and hoses. Biodiesel breaks these materials down faster than conventional diesel and sometimes makes them stretch out so they no longer make tight seals.

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Fuel filter and injector clogging. The metals, plastics, and rubbers dissolved in biodiesel build up in other parts of the vehicle. This can clog fuel filters and injectors and make the piston rings stick.

Overall, vehicle owners typically have to do more maintenance and replace vehicle parts more frequently when using biodiesel blends compared to conventional diesel. These changes are usually not noticeable when using biodiesel at low blend levels such as 5% (B5), but the impacts are a larger problem at higher blend levels such as B20 and B30. Sometimes when an automaker or other party conducts a road test using biodiesel in a small number of vehicles driving under real-world conditions, they do not notice any problems; however, other road tests find significant problems with 20%–50% biodiesel blending and have to replace many parts.

ADDITIONAL IMPACTS

In addition to vehicle compatibility problems, biodiesel has several properties that affect vehicle emissions. Palm biodiesel in particular has mixed effects on harmful pollutant emissions from vehicles; it increases emissions of nitrogen oxides (NO_x), but decreases emissions of other pollutants compared to conventional diesel. Indonesia plans to move to stricter vehicle emission standards, but biodiesel blending could slow the air quality gains realized from those standards. Lastly, biodiesel also increases the vehicle's fuel consumption.

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