

Producing High Quality Biodiesel from Used Cooking Oil in Indonesia

Biodiesel can be produced from many types of oily feedstocks, including crude palm oil (CPO) and waste oils like used cooking oil (UCO). Indonesia currently relies solely on CPO to produce biodiesel even though there is a large potential to collect UCO for biodiesel production. There are some concerns about whether high-quality biodiesel can be produced from UCO, but the reality is that UCO can be an affordable feedstock and can be used to produce biodiesel of the same quality as biodiesel from CPO. The steps needed to accomplish this are clear and can be simple. We review these steps in the upcoming.

KEY FINDINGS

Biodiesel is produced through a process called transesterification. While both UCO and CPO require pretreatment to remove impurities before undergoing transesterification, the methods differ. The impurities found in UCO include solids, water, free fatty acids (FFA), and phospholipids. In addition, after the crude UCO biodiesel is produced, it usually still contains impurities such as methanol, FFA, catalysts, water, glycerides, and other contaminants which must also be removed.

There is a mature UCO biodiesel industry in Europe. The typical European process for producing high-quality UCO biodiesel involves two key steps:

1. During pretreatment, solids and moisture in UCO are removed through a heating, filtration, and settlement process. The UCO is then mixed with a catalyst to remove FFA (a process called esterification or pre-esterification).
2. After crude UCO biodiesel is produced, distillation is used to treat impurities.

There are also several alternative methods available to biodiesel producers:

FEEDSTOCK PRETREATMENT

- » Centrifugation (which usually can be found in large-scale facilities) removes solids and moisture.
- » To treat FFA, there are four methods: (1) contact with an adsorbing material such as activated carbon, silica gel, or clay; (2) neutralization, where the UCO is blended with a basic solution like sodium hydroxide; (3) distillation, which is also used in the vegetable oil industry; and (4) glycerolysis, a process where glycerol is added to the UCO and the mixture is heated.
- » Degumming removes phospholipids, the same as in vegetable oil refining.

BIODIESEL PURIFICATION

- » Wet-washing, where crude biodiesel is washed with warm acidic water.
- » Dry-washing, which uses ion exchange or adsorbent, where the biodiesel is processed in a resin column and then washed with methanol and resin.
- » Putting the biodiesel in a membrane reactor, as in vegetable oil refining.

Policy recommendation: UCO biodiesel production is not currently incentivized under Indonesia's national biofuel program. The Indonesia government could consider incorporating it into the program by making fiscal and non-fiscal incentives available for UCO biodiesel as they are for CPO biodiesel.

UPCOMING PUBLICATION

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