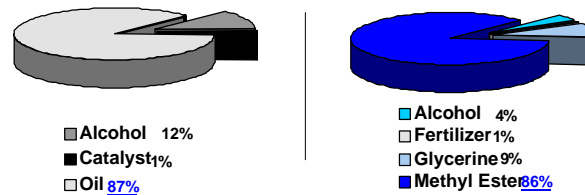


## BIODIESEL PRODUCTION

The production of biodiesel, or alkyl esters, is well known. There are three basic routes to ester production from oils and fats:

- \* Base catalyzed transesterification of the oil with alcohol.
- \* Direct acid catalyzed esterification of the oil with methanol.
- \* Conversion of the oil to fatty acids, and then to Alkyl esters with acid catalysis.

Process Input Levels = Process Output Levels



Nothing is wasted

The majority of the alkyl esters produced today are done with the base catalyzed reaction because it is the most economic for several reasons:

- \* Low temperature (150 F) and pressure (20 psi) processing.
- \* High conversion (98%) with minimal side reactions and reaction time.
- \* Direct conversion to methyl ester with no intermediate steps.
- \* Exotic materials of construction are not necessary.

The general process is depicted below. A fat or oil is reacted with an alcohol, like methanol, in the presence of a catalyst to produce glycerine and methyl esters or biodiesel. The methanol is charged in excess to assist in quick conversion and recovered for reuse. The catalyst is usually sodium or potassium hydroxide which has already been mixed with the methanol.

