

## '08 MCCCDC SUSTAINABILITY DAY



**Check out the Converter Display**

### Group Members:

Ryan Uerkvitz

Martin Rich

Mark McPherson

Mateja Lekic

Selina Velasquez

Josh Crank

Claudia Meece

### **Algae Based Biofuels:**

“Algae can synthesize and accumulate large quantities of lipids or oils in their cells that can be extracted and converted into renewable fuels such as biofuels, aviation fuel, or other transportation fuels.” \* Algae are naturally selected and isolated, which are grown in reactors. The water used to cultivate algae is used more efficiently than to use for corn. Economically, resources are used more sufficiently. Water and algae are separated by a process of dewatering. The extraction of the oils is still under investigation to a more utilized process economically, other than that, the common extraction process is using a solvent (same as extracting corn oil). The oil that was extracted then can be used just like vegetable oil as a biofuel. There are research facilities in cities of Arizona like Chandler, Peoria, Tempe and Phoenix that are researching this type of biofuel production. The algae research and biotechnology team at ASU polytechnic has been researching for nearly 25 years lead by Milton Sommerfield and Qiang Hu.

### **Applications**

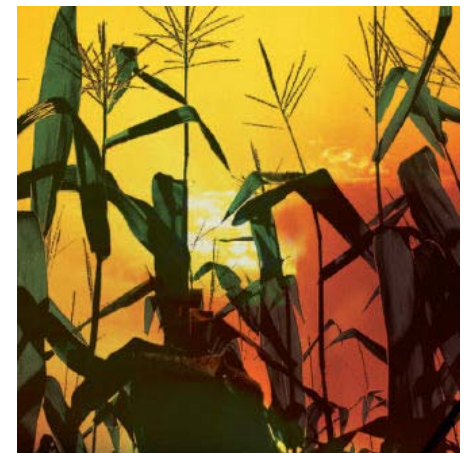
Vegetable oil was first used in diesel fuel in 1900. Rudolf Diesel, the inventor of the diesel engine, designed his original engine to run on vegetable oil.

\*Information for Algae Research and Biotechnology (Milton Sommerfield and Qiang Hu)

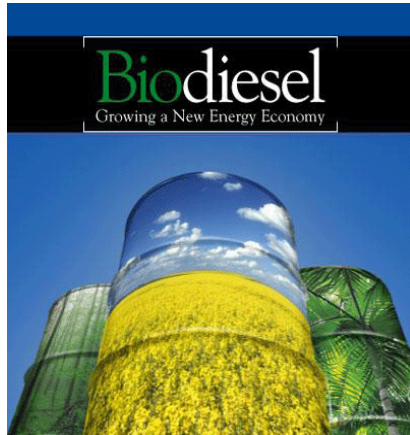
## MARICOPA SUSTAINABILITY DAY

*“Sustainable Development is Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”*  
(Brundtland Report 1987).

Global sustainability is a movement that has gained considerable traction around the world over the last several years. It has affected the business approach and methods of operation for companies, government, and other organizations worldwide. Support for this movement has created an entire industry and will undoubtedly have an even greater social, economic, and environmental impact as the world market settles into the 21<sup>st</sup> century.



## BIOFUELS



One source that people are looking to as an alternative to the depletable fossil fuels is biofuel. Biofuels, or bio-organic fuels, is the scientific name for a plant or animal-derived substance that can burn. These combustible chemicals can be used for production of electricity and heat, and as of 2005, energy from biomass provided approximately 15% of the world's energy consumption. Because of their low polluting emissions, biofuels are also being considered as replacements for gasoline to power transportation vehicles. Not surprisingly, biofuels have had a growing impact in the automotive industry and today this is where their use is most common among the alternatives to transportation fuels.

### Advantages to Biofuels

There are several advantages to biofuels over other types of fuel. Here are a few:

- They are a renewable energy source, unlike petroleum and other nuclear fuels
- They are non-toxic (biodegradable)
- They are less flammable than petroleum, due to their higher flash points
- They release fewer noxious emissions than gasoline & petroleum-based diesel

### Disadvantages

Along with the advantages, there are also some concerns. They are:

- On a large scale, use of biofuels would require considerable land use to grow the agricultural products – this would consume cropland and cause conflicts with global food supply
- Biodiesel gives off more nitrogen oxide emissions than petroleum
- Biodiesel is currently more expensive (2007 data) than other petroleum-based fuels
- Biodiesel gels in cold temperatures

### What can be used as a Biofuel?

There are various forms of biomass that can be used as biofuel. The biomass that is preferred usually depends on the location of the user. In the United States, products grown to use as biofuels include soybeans and corn. In Europe, flaxseed and rapeseed are primarily grown. Brazil grows sugar cane, and palm oil is grown in Southeast Asia.

There are also other biodegradable products that can be used from farming, agriculture, forestry, and households. These include straw, manure, rice husks, sewage, and food leftovers. Through the process of anaerobic digestion, these products are converted to biogas, which is a biofuel that can be an alternative for generating electricity and powering heat engines.

Additionally, there is much research currently under way investigating the use of algae as a biofuel. This energy source can potentially be used to produce biodiesel, bio-oil, ethanol, and bio-hydrogen.